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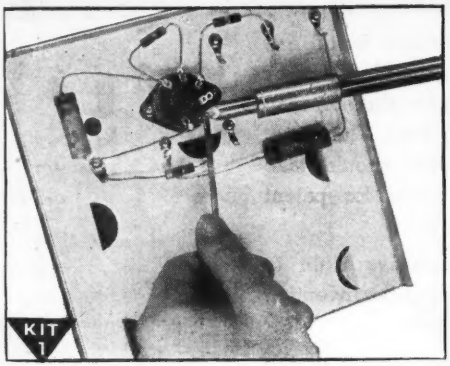
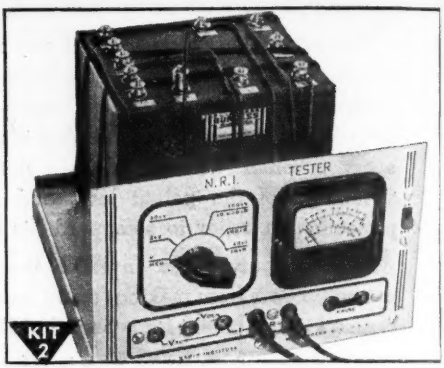
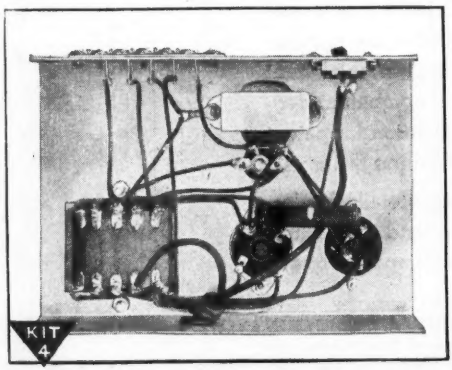


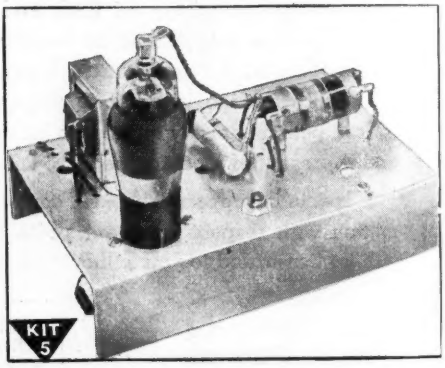
I send you Soldering Equipment and Radio parts; show you how to do Radio soldering; how to mount and connect Radio parts; give you practical experience.



Early in my course I show you how to build this N.R.I. Tester with parts I send. It soon helps you fix neighborhood Radios and earn EXTRA money in spare time.



You get parts to build this Vacuum Tube Power Pack; make changes which give you experience with packs of many kinds; learn to correct power pack troubles.



Building this A. M. Signal Generator gives you more valuable experience. It provides amplitude-modulated signals for many tests and experiments.

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Fixing Radios Profitable Hobby

"I am doing radio work in my spare time, and find it a profitable hobby. My extra earnings run about $10 a week. I certainly am glad I took your N.R.I. course."—FERDINAND ZIRBEL, Chaseley, North Dakota.

Chief Engineer, Station KWLM

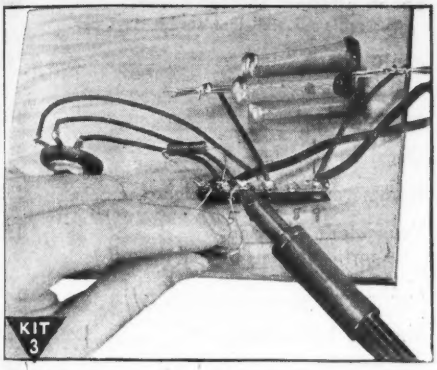
"Am now Chief Engineer of Station KWLM and in charge of maintenance of Police Station KRIN, County Highway Dept. Also have my own business. Mighty glad to be in radio."—LLOYD V. STENBERG, 516 Litchfield Ave., W., Willmar, Minn.

Still Climbing in Aircraft Radio

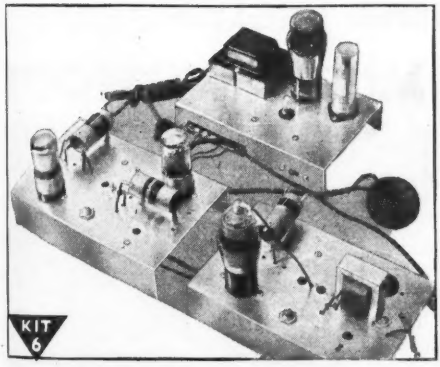
"I am still climbing as a result of my N.R.I. training. I now do aircraft radio work at Greenwood Army Air Field, and operate a radio shop in my spare time."—JAMES L. BOYETTE, P. O. Box 218, Greenwood, Miss.

by Practicing in Spare Time

I Send You 6 Big Kits of Radio Parts



You get parts to build Radio Circuits; then test them; see how they work; learn how to design special circuits; how to locate and repair circuit defects.



You build this Superheterodyne Receiver which brings in local and distant stations—and gives you more experience to help you win success in Radio.

SAMPLE LESSON FREE

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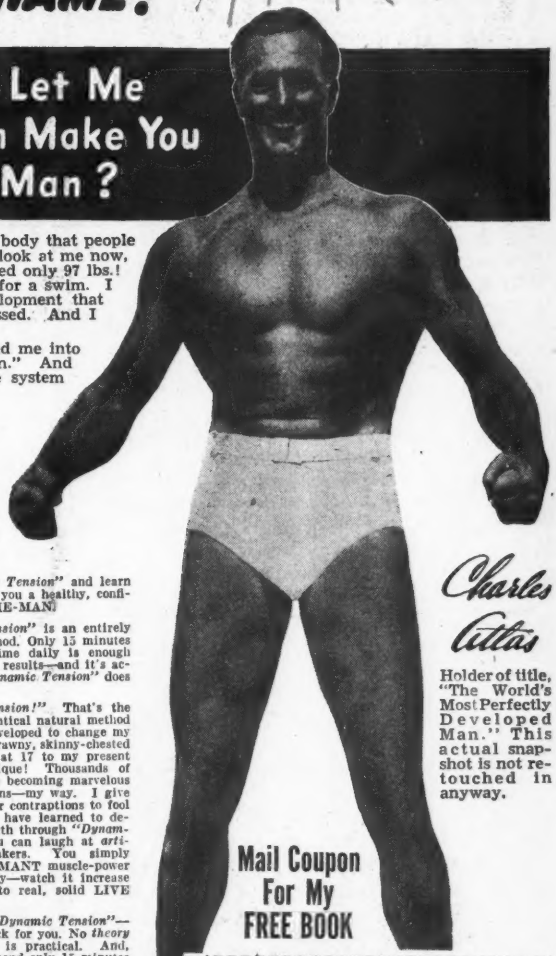

I KNOW what it means to have the kind of body that people pity! Of course, you wouldn't know it to look at me now, but I was once a skinny weakling who weighed only 97 lbs.! I was ashamed to strip for sports or undress for a swim. I was such a poor specimen of physical development that I was constantly self-conscious and embarrassed. And I felt only HALF-ALIVE.

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My method—*"Dynamic Tension"*—will turn the trick for you. No *theory*—every exercise is practical. And, man, so easy! Spend only 15 minutes a day in your own home. From the very start you'll be using my method of *"Dynamic Tension"* almost unconsciously every minute of the day—walking, bending over, etc. — to BUILD MUSCLE and VITALITY.

Charles Atlas

Holder of title, "The World's Most Perfectly Developed Man." This actual snapshot is not retouched in anyway.

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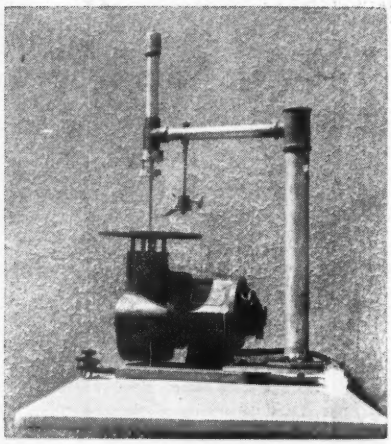
We'll "Come Again"

When Tom McCahill started up his "MI Tests the New Car" series we knew we had a good thing for you, Mr. Reader, but we hardly dreamed then, *how* good! It was a case of the right thing at the right time. Tom is one guy who knows autos, is honest, and can put his facts across—and you Readers, hungry for one of the new cars, were avid for his facts—so the dope we were able to give rang the bell, one article after another.

Everyone applauded the series: auto manufacturers wrote in to thank us for our impartiality (their noses smarting a little, probably, from one or more of Tom's pokes), auto dealers and salesmen learned the contents of the whole series by heart; thousands of reprints were sent out at the special request of individuals not able to get them otherwise—and your own chorus of thanks and "Come again!" still rings in our ears.

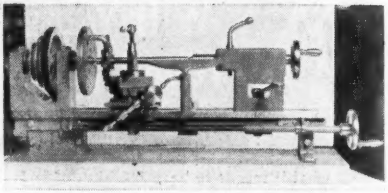
Thank you, Readers we certainly shall "Come again." The new cars of 1947—if there are any—will be covered just as impartially.

FROM SOUTH AFRICA



Reader R. C. Mouatt of Johannesburg, South Africa sent us several pictures of shop equipment which he built. The jig saw, reproduced here, is really a beauty. A Workbench Award and a $10.00 check are on the way to Jo'burg. Note to Mr. Mouatt: Publication of HANDY MAN'S HOME MANUAL and HOW TO BUILD IT is expected in the early part of 1947.

MI LATHE



A $5.00 Workbench Award is on the way to Leo and Gene Benus of Brooklyn, N. Y., for this fine lathe they built from plans which appeared in the June, 1944, issue of MI. The boys, aged 15 and 16 years old respectively, made the lathe in their cellar machine shop. It took about 10 months to complete the project.

Color Photo Contest

The winners in MI's Color Photo Contest will be reproduced in full color in next month's issue. The increasing popularity of this contest, as evidenced by the number of entries received, bids fair to make this event an annual feature in the pages of MI. Our next contest, then, the Fourth *Annual* Color Photo Contest will be launched within a few months. Now is the time to start planning your entries. Even though short winter days may handicap outdoor picture-taking in color, yet long winter evenings are just what we need to take those interior shots which we always seem to be putting off.

Fingers for Paint Brushes

If you've never painted a picture with your fingers, you might try it some time (and this is no gag). It may be good for you. Psychiatrists are beginning to make us do just that in order to find out what's the matter with us. It's simple. You wet a piece of paper, squirt on a few blobs of color, then swirl around the paint as your fancy pleases, using your finger tips, fists, even forearm. You'll end up by making some kind of a design or composition that has special significance for you.

What will your design mean? Ah—it takes a whole article, with a lot of pictures, many in full color, to tell you all about that; but you'll find the article in the next issue of MI under the title, "Paint with Your Fingers!" so be sure and pick up your copy early and read one of the most interesting scoops we have had in some time.

And it's a sure bet that you'll specially like Ed-

[*Continued on page* 18]

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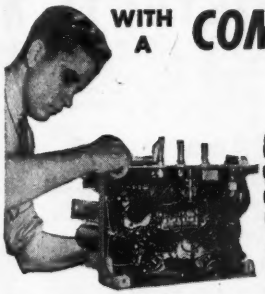

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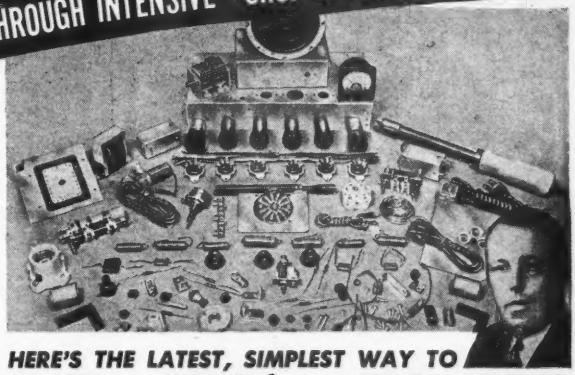

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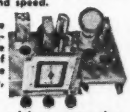

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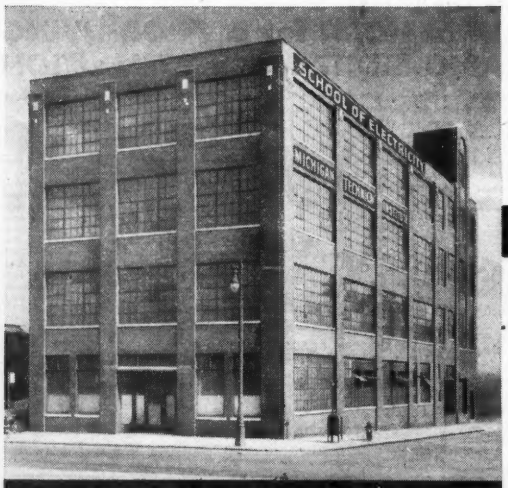

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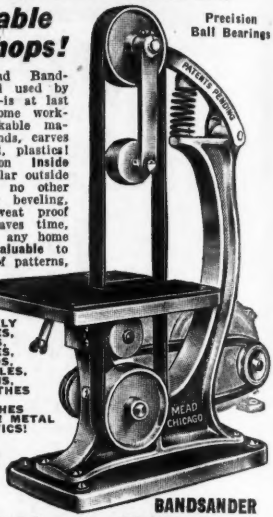

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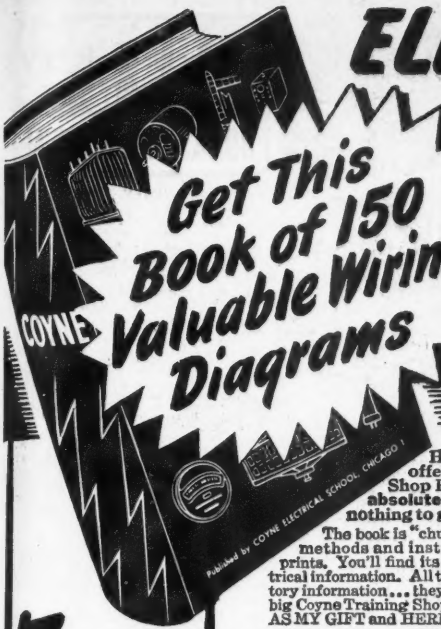

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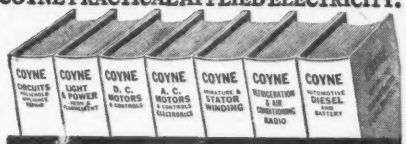

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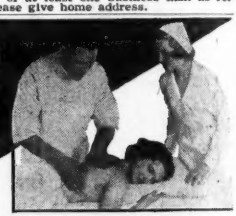

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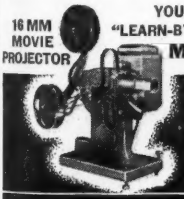

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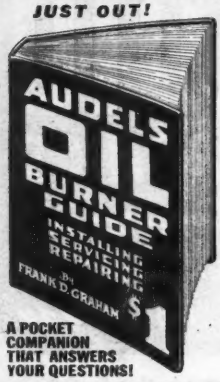

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Editor's Workbench Chips

[*Continued from page* 10]

ward Kelly's "Daredevils on the Run," the story of bobsledding, also in color in the next issue.

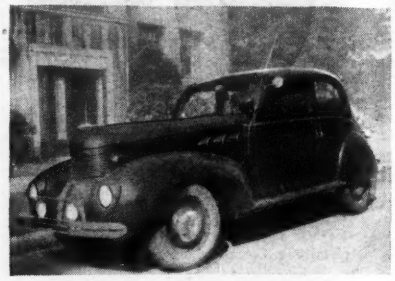
Future Einsteins?

Diligence and talent will pay off when 40 science students meet in Washington next March to learn which most resembles Einstein. Not in looks, in brains. They're all high school seniors.

Two of them, one boy and one girl, can soon stop worrying how they'll go on to university. They'll each get a $2,400 scholarship. Eight more will carry off $400 each.

All this is thanks to the Westinghouse Educational Foundation, which began the annual search for geniuses six years ago. Since then, 1,500 scholars have been recognized as "potential scientists" and 200 of them have received a total of $55,000 in awards.

CAN YOU GUESS THE MAKE?



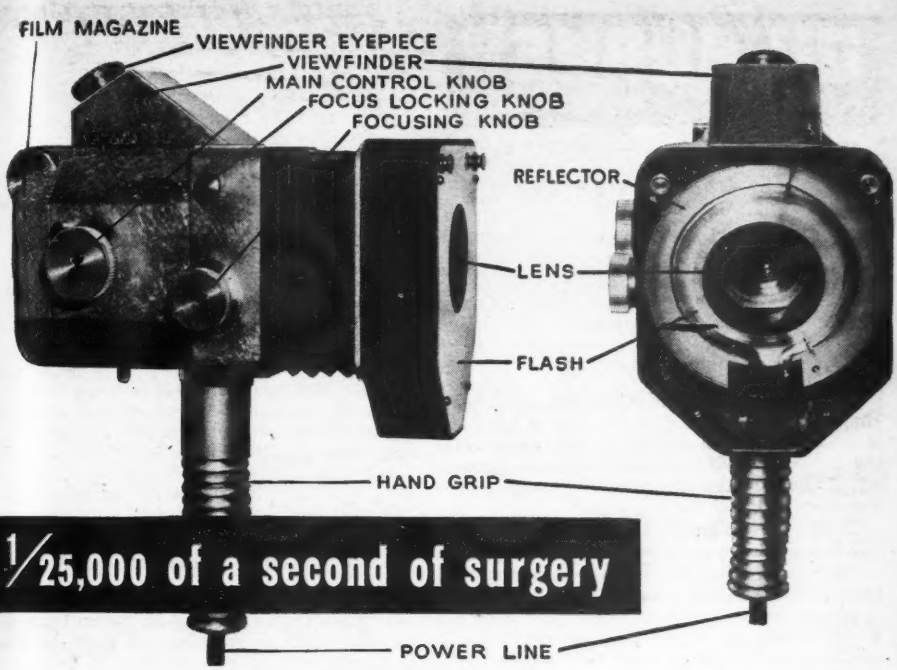
If you can't, we can't. It has a Fiat body, Nash wheels and brakes, Studebaker hub caps, Mercury fenders and a Ford motor. It was built by Harry Delalaye of Seattle, Wash., to whom we are sending a $5.00 Workbench Award. The car, which does 30 miles per gallon, took two years of spare time. Guess Mr. Delalaye just knew there'd be a car shortage.

X Marks the Taste

Does your food taste good? If it doesn't, it may be that what you eat is short of Nutrient X, the newly found palatability vitamin. X is found in several milk products, lettuce, egg yolk, beef and pork muscle, alfalfa and bluegrass and alfalfa and timothy hays. It is not present in whole wheat flour, white flour, enriched white flour, yeast, cornmeal, soybean oil meal, linseed oil meal or heat coagulated egg white. Liver extract is a rich source.

Scientists do not yet know the chemical nature of Nutrient X, but they do know that the palatability it confers on a food is also dependent on the body's need for that particular food and the use the body makes of it. The substance is very

[*Continued on page* 22]



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Mr. Kraus has been giving advice to inventors for more than 20 years. He will attempt to answer as many letters from inventors as possible in his column each month. Mr. Kraus will "call his shots as he sees them" in this column. Thoroughly versed in inventions and inventions procedure, he will never, under any circumstances, disclose any valuable secrets. He cannot answer questions relating to patent law. For such information, the Editors suggest you communicate with any one of the patent attorneys who advertise in MECHANIX ILLUSTRATED.

Road Map

Robert Lee of Oakland, California, sends us a clipping of our comment in the August issue and also a clipping from another publication describing a similar item invented by Martin Brownshield which is expected to make its appearance. He wants to know "Who is right?"

Charles A. Miller of Utica, New York, and others also direct our attention to this topic.

ANSWER: *The statements made in our reply are not modifiable by the report that such an item is to appear on the market. The report does not supply details for a correction factor which is needed to make such a gadget work satisfactorily.*

Our comment stated: "If you could develop a practical feed mechanism which would be accurate at all times. . . ." Nothing in the report at hand suggests that the variables have been corrected.

Door Stop

John Dillow of Nashville, Tennessee, has designed a door stop on which he wants an opinion as to its marketability.

ANSWER: *The design, we regret to advise, is not original with you. A door stop of almost exactly the same construction is found on many of the doors of home garages. It is too ugly to put on house doors.*

Electric Mixer

Raymond M. Haines of Palmyra, New Jersey, wants to know about the value of a mixer for photographic chemicals.

ANSWER: *We see nothing new here. You have merely made use of an ordinary chemical stirrer which is available on the market again.*

Pricing for Sale

Bradford E. Pike of Athol, Massachusetts, hopes to put an item on the market and wants to know how much to ask for it.

ANSWER: *Usually about five times manufacturing cost is considered satisfactory. Remember that the jobbers get 40 to 50 percent off. Then there is the sales cost which should be considered, so you get less than half of the selling price to cover all your costs, overhead, advertising charges and profit. If the actual cost to manufacture, including wages for all help, materials, dies, jigs, etc., of each item is $1.00, its selling price should be not less than $5.00. Now, you should determine if it will sell at $5.00.*

Radio Oscillator Circuit

Leonard J. D'Ario of Brooklyn, New York, submits a circuit diagram for use in transmitters on ultra high frequencies and wants to know if it is original.

ANSWER: *This is really a matter to take up with a patent attorney. There are so many thousands of circuits that only a thorough search will reveal if you have anything patentable. We recommend that you have such a search made.*

Umbrella

G. L. Nicely of Covington, Virginia, furnishes a suggestion for an inexpensive folding umbrella. His questions are made clear by the answer.

ANSWER: *If your wishful thinking could be converted into a practical construction we would be inclined to recommend that you apply for a patent on your umbrella design.*

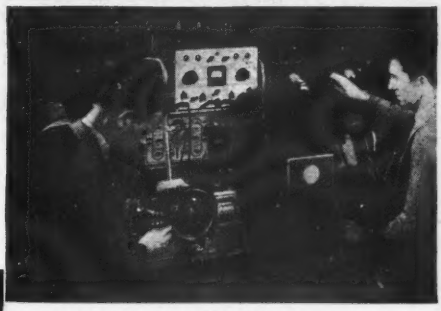
But, can you make an umbrella of this sort for five cents? That is the maximum you should spend for the construction of any item which is to retail for a quarter. The cardboard tube for the handle alone would cost two cents. This leaves only three cents for the rest of the construction and packaging.

Now, if you can design some unique, novel method of construction which would permit of manufacture entirely by automatic machinery; if you can build the machine, and if you can in fact produce an umbrella at five to seven cents, to retail for twenty-five cents, you have a worthwhile invention which should meet with favorable response.

If you are puzzled at the difference between manufacturing costs and selling price, remember the dealer gets about 50% off. The jobber gets 10

[Continued on page 35]

Learn RADIO-ELECTRONICS-TELEVISION



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Editor's Workbench Chips

[*Continued from page* 18]

essential. Rats on a relatively high protein diet usually died if Nutrient X was lacking but lived and grew 85 percent of normal if the same diet was supplemented with X.

MODEL B-26

A $5.00 Workbench Award is on the way to Sgt. Larry Rosenthal of Stevens Point, Wis., for this superb model of a B-26 which he built. Called the "Missbehavin'," it's one of the finest examples of true-to-scale workmanship we have seen in a long time. (Have we promoted you, Sarge? We're not quite certain of the chevrons.)

Isotope Kayoes Cancer

After a lot of talk about the possibility of treating cancer with radioactive substances, the thing at last has been actually done. Dr. Low-Beer has treated two types of the disease with by-products of atomic research with great success.

Both types were skin cancers, neither a rapidly-spreading one which causes death. Treatment of cases of basal cell carcinoma were 98 percent effective, tumors being removed in 51 out of 52 patients; treatment of hyperkeratosis was 100 percent effective in 36 cases. A total of 301 patients with cancer and warts were treated.

Dr. Low-Beer stated that the treatment was as good as X-rays, radium and surgery for these afflictions. He cautioned that the treatment is applicable only to superficial skin cancers and warts, and held no hope that it could be applied in the near future to deep-seated tumors.

The many artificially-radioactive isotopes vary greatly in the strength, type, and penetrating

[*Continued on page* 24]

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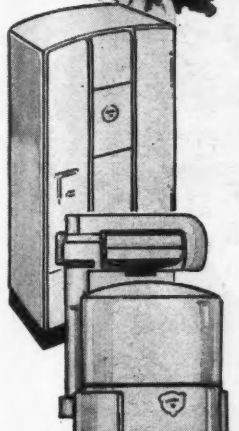

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I have received your Course in Appliance Repairing and I must say I am well pleased with same. I am only sorry I did not have said Course some years ago. I have learned so much more through this course I would not part with it.—Charles Schwarz, Hamilton, Ohio.

The Course in Appliance Servicing arrived a few days ago. Want to take out a few minutes of my valuable time to let you know that this is just what I have been looking for ever since I opened up my Fix-It shop. I must admit that you told the truth when you said that it contains quite a bit more information than I bargained for.—P. J. Bretl, Sebring, Ohio.

I am a mechanic for the Western Union Telegraph Co. Three days after receiving the lessons in refrigeration I earned the exact cost of the course.—Henry S. Lee, Washington, D. C.

I work day times at the shipyard and after 4:00 P.M. I operate from my cellar and garage. I average $10.00 to $15.00 clear every day.—Walter Hanby, Brockton, Mass.

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Editor's Workbench Chips

[*Continued from page 22*]

power of the radiations they emit; so scientists believe it may be possible to choose different radio isotopes specially suited for the treatment of different types of malignancy.

FATHER AND SON PROJECT

John Urbas tells us he has real reason to be proud of his son Jackie who helped him construct this red and cream model plane from MI plans. We're only too glad to send Mr. Urbas a $5.00 Workbench Prize. (P.S. Jackie, make sure Dad turns over the check to you.—Ed.)

Fish and Fission

Atomic power plants are not friends of the fish.

When uranium 235 and plutonium become available in quantities sufficient to run civilian power plants, special measures will have to be undertaken to save our finny friends.

Atomic fission plants require great quantities of water for cooling purposes. After this water has served its purpose the easiest way to get rid of it is to let it run into the nearest river. But such water will not only be hot, it will also be radioactive, and the combination can be anywhere from unwholesome to lethal for fish and the minute aquatic plant and animal forms that serve them for food.

The present military atomic plants do not cause such trouble because they employ elaborate safeguards; but these safeguards are expensive, and

[*Continued on page 26*]

GET INTO RADIO TELEVISION ELECTRONICS NOW!

This practical shop instruction system gives you actual experience with a Home Radio Laboratory—part of the

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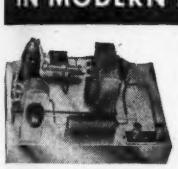
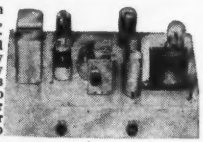


Your National Training Kits include equipment for over a hundred practical electronic experiments in your own home. You get standard radio parts for this audio oscillator which you get to understand by building it yourself.



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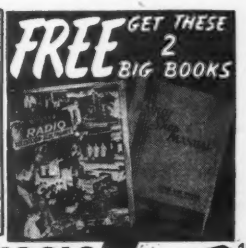

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You, too, can share the success of National graduates. Clifford Hannah, Portage La Prairie, Manitoba, Canada, writes: "My training has brought results as I'm in line for another raise, thanks to National's encouragement and thorough training. You can count on me as a real National booster and I am glad I used such good judgment in getting into a live and growing field."

While still a student of National training, I. Wilson of Vallejo, California, writes: "My pay has jumped from $52.18 a week to $72.65, and the end is not in sight. I am proud of my National Course."

Joseph Michel, Jr., Granite City, Illinois, writes: "I am enthused with National training. I am now earning $225 a month as a radio operator and technician and $20 a week more in my shop at home."

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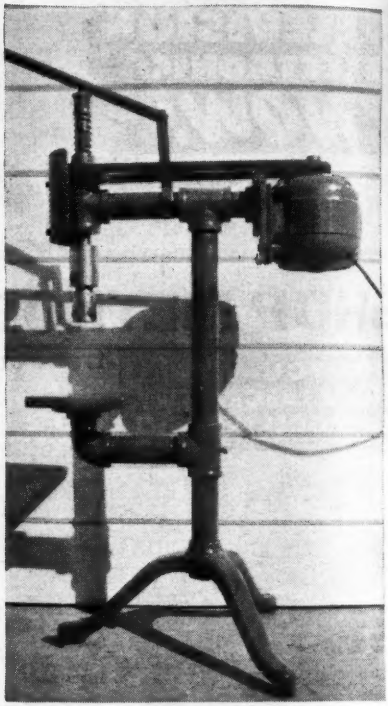
Editor's Workbench Chips

[*Continued from page* 24]

the natural thing for commercial plants is to keep costs at bottom. The old conflict over stream pollution may yet go on for a while, with new ammunition.

MI DRILL PRESS



A $5.00 Workbench Award is on the way to Walter E. Crow of North Sacramento, Cal., for this sturdy drill press built from MI plans. Note how use of pipe fittings reduce machining

Come Out of the Lab!

We feel we should pass on this quote from an address by Dr. H. J. Prebluda, of U. S. Industrial Chemicals, Inc., given before the Eleventh Annual Chemurgic Conference in St. Louis recently:

"It is high time for scientists to leave their spheres of laboratory isolation, and take part in solving the greater problems facing the world. Scientists should make their influence felt outside the laboratory walls. They should participate along with their fellow men in the councils of world statesmanship and, with their background of scientific vision, courage, and practical foresight, actively contribute in working out a solution to perplexing social problems. Only by so doing will there be a durable peace."

[*Continued on page* 28]

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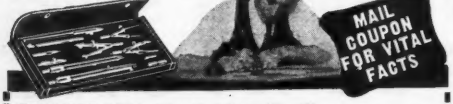

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Editor's Workbench Chips

[*Continued from page* 26]

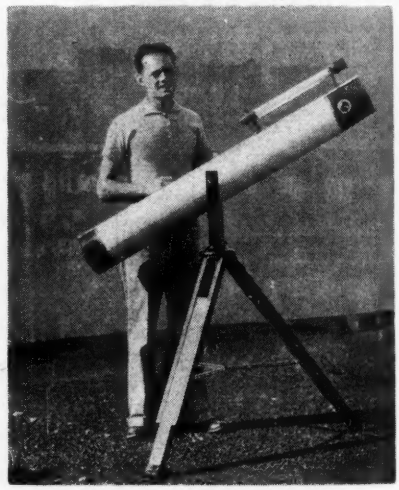
Television Sets For Free

It's all free. A truck stops in front of your house, workmen carry a shiny new television set into your front room, install the antenna and plug the cord into a socket. You pay absolutely nothing. Nothing, that is, until you get ready to turn the knob. It won't turn until you drop a coin in the slot.

That's the picture presented by Tradio, Inc., who expect to have their 20-tube, seven-inch screen "TradioVision" in assembly line production this month. They claim it will be the stimulus television broadcasters need, an assurance that their programs will be seen and heard by a rapidly growing number of people.

The makers believe they'll have to charge fifty cents for each half hour, perhaps only a quarter later. The set looks substantial rather than beautiful and the five and seven-inch screens are comparatively small. But TradioVision boasts the following: 500-line definition, acoustic modulation, low power consumption, complete plug in unit assembly to simplify on-the-spot service, and no complicated tuning.

MI EDITORS HAVE THEIR HOBBIES TOO



In this case it is astronomy. Now we'll let you guess which one of our editors is so passionately interested in the stars (those in the sky) to build this six-inch reflecting telescope. It's a labor of love—lens, mirror, prisms, tube, stand and finder telescope all built by hand. Cost about $25 plus a year of spare time.

Weapon for Tooth Decay

Swabbing sodium fluoride on the teeth of school children reduced tooth decay 40 per cent when

[*Continued on page* 31]

In Your Mind's Eye

The Secret of MENTAL CREATING

IF you just like to dream, read no further. There comes a time when your fancies *must be* brought into light—and stand the test of every-day, hard realities. Are you one of the thousands—perhaps millions—whose thoughts never get beyond the stage of *wistful wishing?* Do you often come to from a daydream with the sigh, "If only I could bring it about—*make it real?*"

All things begin with thought—it is what follows that may take your life out of the class of those who hope and dream. Thought energy, like anything else, can be dissipated—or it can be made to produce actual effects. *If you know how to place your thoughts* you can stimulate the creative processes within your mind—through them you can assemble things and conditions of your world into a happy life of accomplishment. *Mental creating* does not depend upon a magical process. It consists of *knowing how* to marshal your thoughts into a power that draws, compels and organizes your experiences into a worth-while design of living.

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Editor's Workbench Chips

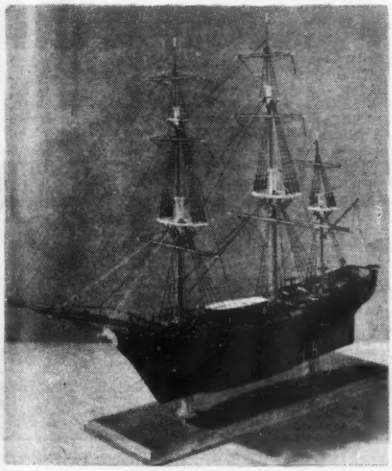
[*Continued from page* 28]

the treatment was given three times, four Minnesota dentists found. It has been known for some time sodium fluoride is able to prevent tooth decay when it is in the water children drink during the years when their teeth are developing.

Best results, they believe, will be obtained when children are given from four to eight treatments. For permanent teeth, two treatments gave more than twice as good results as one treatment, and three treatments gave twice as good results as two.

The treatment consists in thorough cleaning of the teeth by a dental hygienist and application of a two per cent solution of sodium fluoride.

THE GOOD SHIP BOUNTY



A $5.00 Workbench Award is on the way to Kenneth Currie of Detroit, Mich., for this fine ship model he made. It took him about six months of his spare time. Every knot in the rigging is tied by hand, Mr. Currie informs us —a very neat job.

More and More Trumpeters

The trumpeter swan, believed to be an extinct species only 40 years ago, added a 60 to its comeback score during 1946. A census shows a total of 361 birds, as compared with 301 in the preceding year.

Most of the known nesting sites are concentrated on the Red Rock Lakes Refuge in Montana and in one valley in the northeastern part of Yellowstone National Park. The remaining population is scattered over adjacent areas in the Northwest.

The trumpeter swan is a magnificent bird with an eight-foot wingspread. It was once fairly

[*Continued on page* 33]

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Editor's Workbench Chips

[*Continued from page* 31]

abundant, but reckless killing for their breast skins and down during the latter part of the nineteenth century, combined with drainage and cultivation of their nesting areas, practically wiped the species out.

In 1907 a few survivors of the supposedly extinct species were discovered, and the long, slow job of helping the birds to survive was begun.

BUILDS OWN CAR

This two-passenger roadster was constructed by Franklin Inman of Goose Creek, Texas. A Ford motor and radiator are located in the rear of the car. The power take off is by means of V-belts; the gas tank is directly below the "radiator" ornament. Total weight of the car is 2350 pounds. It must have been quite an ambitious undertaking, Mr. Inman. See your mailman for a $10.00 Workbench Award.

Patching Up the Heart

Patients with some kinds of heart disease may in the future have fresh, living muscle grafted onto their hearts to replace dead bits of muscle in their own hearts.

This possibility appears from studies reported by Drs. Mandel Weinstein and Benjamin G. Shafiroff of New York University College of New York University College of Medicine.

Muscle strips from the abdomen and legs were successfully grafted on the heart muscles of dogs, they have reported. Within two or three days after the operation, the dogs were up and about their kennels, except some which became infected. They were exercised daily and showed no signs of heart trouble.

Outdoor Infa-red Heater

Infra-red heat rays from an oil-burning heater developed at the Michigan State College agricultural experiment station may save farmers

[*Continued on page* 162]

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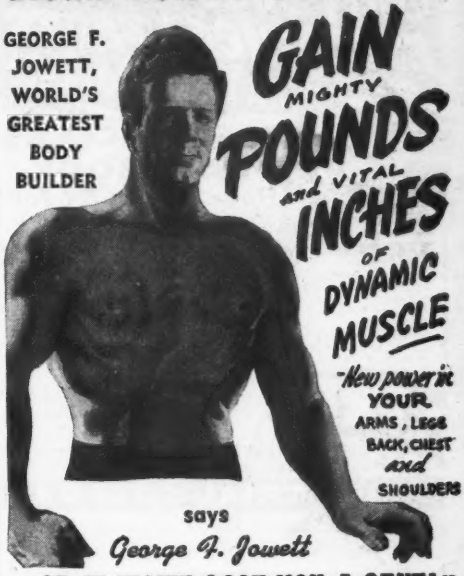

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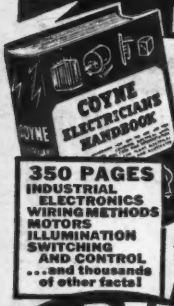

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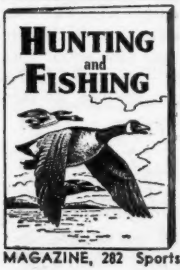

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Your Invention Clinic

[Continued from page 20]

to 15%. This leaves you about 6½ cents for rent, light, phone, amortization, machinery, advertising, publicity, travel, sales, stenographic help stationery and mailing costs.

Car Battery Disconnector

J. D. Minton of Tampa, Florida, suggests a mechanism to disconnect the circuit close to the battery of the car.

ANSWER: *Your theory of disconnecting the circuit of an automobile close to the battery terminals by operation of a dash control is good, of course. In early auto days this is the way cars were built. Today, many autos are unfused; some even dispense with circuit breakers.*

But unless you can develop a new and novel way to disconnect the circuit close to the battery terminals, you will not have much of an invention. Cable controls are not desired; electrical ones could not be used because you would be defeating the protective scheme you are trying to produce.

If you can design a satisfactory mechanism to do the job, we would suggest you query us again after investigating its patentability. If you can make the item in the form of an attachment applicable to any car it might meet with favor.

Bottle Opener

Cecil B. Woodruff of Detroit, Michigan, is having trouble getting a model of a bottle opener made for him. He wants to know if such a model could be built. His other queries are made clear in our reply.

ANSWER: *Your invention looks good and appears practical. It could be improved greatly by the addition of two turning handles which would permit of its use whether right side up or upside down.*

The second estimate for constructing the device appears exhorbitant. The first estimate is more in keeping with the amount of work involved. Not only can the model be made but you can probably make it yourself.

Just get a brass spinning similar to the one used on an electric light canopy. Get a cup to fit the cap. Have the two pieces soldered together, then hacksaw the slots, file and buff.

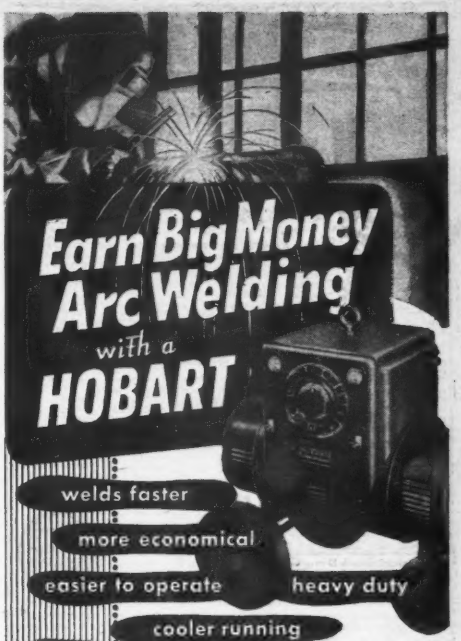
Hard or silver solder is suggested. In the final manufacture, the article could be made of steel. Tempering is not a requirement. We suggest you plan to do the job yourself, or have a local tinsmith make the model for you.

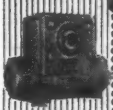
Soap Saver and Cookie Cutter

Herb. W. Sellwood of Cleveland, Ohio, sends a diagram of a ribbed soap tray and a three-fold cookie cutter.

ANSWER: *There is nothing particularly new in your design of the soap tray. Unfortunately this*

[Continued on page 37]

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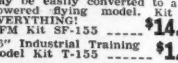

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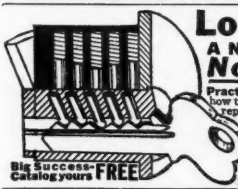

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Your Invention Clinic

[Continued from page 35]

design does not do the job properly. In fact, we do not know if any tray modification which could be counted upon to allow the soap to dry. The reason for this is that the surface layer of the soap gets very soft. Hanging soap from a string or placing it on a point or putting it in a heated tray offers the best solution. Much work still needs to be done on soap trays and ash trays.

Your design for a cookie cutter is unusual, but that is all that can be said in its favor. It is more expensive to produce than three separate cutters, more difficult to handle, harder to wash, offers more sales resistance and in general has nothing to commend it.

Our suggestion is that you try to lick that soap tray problem but it is a knotty one. The solution is not easy. Forget the cookie cutter. And thanks for your compliments.

Automatic Pin Setter

Frank Orr of Florence, Alabama, sends a diagram of an automatic pin setter for bowling alleys.

ANSWER: *For a toy bowling alley this system would be too expensive. For coin-in-the-slot mechanisms such a system might be invoked but there are better ones already in use. For a full scale bowling alley the cords interfere with the freedom of the pins and would give false scores. Particularly would this be the case if one of the pins could be caused to fly off diagonally to the side. The cord it carries with it would upset other pins without justification.*

Cork Extractor

Frank J. Figura of Binghampton, New York, submits two designs for corks with wire extractors affixed to them.

ANSWER: *More than 26 years ago corks were fitted with similar wire extractors. Most druggists had them.*

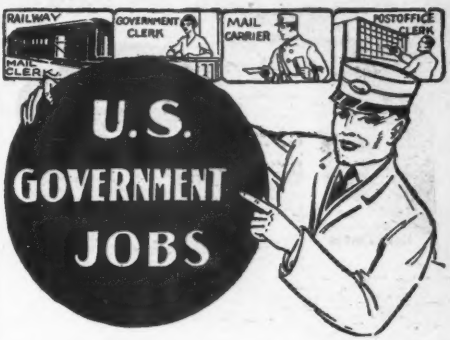
Motor Timing

Henry L. Thiesen of Soledad, California asks several questions concerning timing of gasoline engines.

ANSWER: *In our opinion the vacuum method for control of ignition could be made more easily regulatable than the solenoid method. Perhaps a straight mechanical system would offer the greatest advantages.*

But suppose you do develop a practical method, what are you going to do with it. Most cars can travel a lot faster than is permitted by law, and faster than is safe for them on congested roads. It is not likely that auto manufacturers would want to put this sort of a device on the cars they make and the gadget is not a good thing to make as an attachment.

[Continued on page 38]



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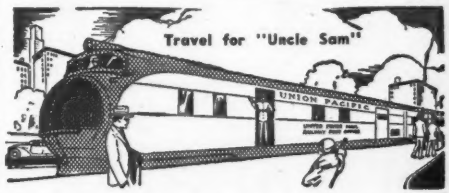

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Your Invention Clinic

[*Continued from page 37*]

If you will recall the early days of the auto you will find that both spark and gas control levers appeared on every auto. Why return to the complications? We suggest you forget it.

Salt and Pepper Shaker

Benjamin F. Elmore of Prichard, Alabama, sends patent specifications of a combination salt and pepper shaker and wants us to tell him exactly how we see it and what his chances are for a successful market.

ANSWER: *Fully forty years ago one could purchase combination salt and pepper shakers. These have appeared on the market from time to time in many different styles, so the general thought for such a dispenser is not unusual, even though your method for arriving at the result does differ.*

But is this superior? You have a mixing chamber in the head. You mix salt and pepper, then assume you can switch to pure salt, but that is based on the assumption that the head has been cleared of its contents, with which assumption we do not agree. We believe you will find this true after you make your model. Again, some folks like only a little pepper and more salt, or vice versa. You cannot control the mixture in your arrangement. Frankly, we can see little advantage to the mixing chamber.

Insofar as marketing this invention, we wish we could offer a rosy outlook, but in our analysis of similar devices we cannot foresee a simple speedy acceptance of your product by a manufacturer. This means that you may have to manufacture the device yourself and try to develop the market. We are afraid you will have tough going.

Button Fastener

Wilton E. Proctor of Los Angeles, California, states that the lady friend has come up with a neat little idea for fastening metal-backed buttons to a dress.

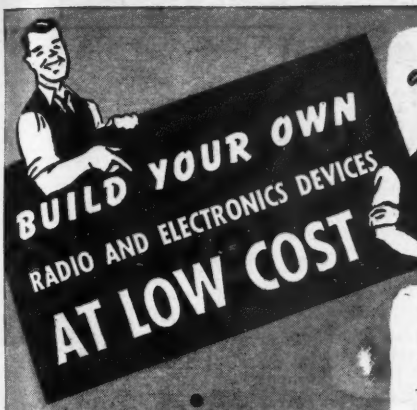
ANSWER: *Yes it does look like a neat little idea, certainly worth investing a little cash in having a search made by your patent attorney. You should be able to commercialize the item, so if the search reveals clear sailing would advise that procedure and recommend you get started in a big way. A demand for the item seems assured.*

Tree Felling Tractor

Robert W. Forsyth of Sugar Hill, New Hampshire, asks about a tractor fitted with a tree felling attachment about which he wants us to comment.

ANSWER: *We do not see on what grounds you hope to base claims for your patent. Motor-driven saws have been developed before. Some are similar in design to the sketches you submitted.*

[*Continued on page 44*]



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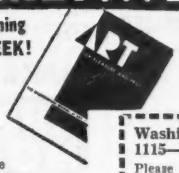

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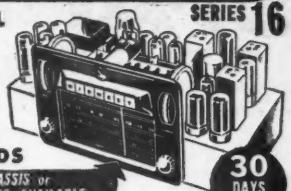

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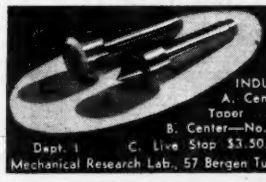

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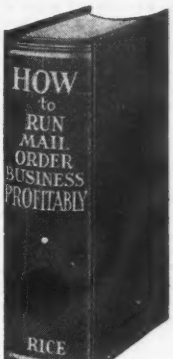

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Your Invention Clinic

[*Continued from page 38*]

But there are a few items on which you can work. One of these is a feed mechanism to advance the saw at a predetermined speed. Suggest you investigate the field first.

Pipe Cleaner

Harold E. Stump of Lancaster, Pa., sends a suggestion for a system which should serve to blow out gas and drain pipes. He wants our advice.

ANSWER: *Your proposed system would work, of course, but the economics of the situation are not exactly favorable to the proposed method. Remember, the same suggestion you offer could be used to inflate auto tires, but it is not likely that it will be so used except in emergency. We doubt that your plan can be protected but certainly would recommend a search.*

Shaving Kit

P. Zawislak of Missanabie, Ontario, Canada, suggests a two piece shaving kit provided with a suitable clamp. He wants our advice.

ANSWER: *The only favorable aspect of your shaving kit is the proposed clamp. You have furnished no details of this. Presumably it will not interfere with normal operations. Now, if you can design such a clamp which will hold with reasonable security we would certainly recommend that the item be searched and patented, if that is possible.*

Whether the kit is of one or two piece construction doesn't much matter. The clamp is the thing on which you should centralize your efforts. But it is a large order. The supports are so variable.

Automatic Air Strip Map

Lt. P. N. Garay, Naval Station, Norfolk, Va., recommends a clockwork fed air-strip map which would advance as the plane travels thus keeping the pilot appraised of his route.

ANSWER: *We didn't think much of this idea when offered for use on an automobile because of the many variables which can be corrected with difficulty only and which cannot be accurately preset at any time.*

These variables are present in greater numbers in the case of an airplane. A plane making 100 miles per hour travels only 80 ground miles against a 20 mile head wind; if the wind is from the tail the ground speed is 120 miles. This makes a difference of 40 miles in advance of the map, depending on the wind. If the wind is 30 miles the difference in map advance amounts to 60 ground miles in each hour of travel. When you get to quartering winds you run into still greater difficulties which you must multiply if winds are variable along the route. Now if you had an accurate speedometer which would give speed of

[*Continued on page 46*]

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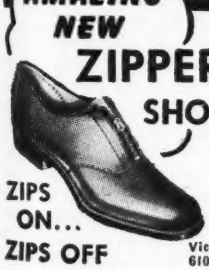

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Your Invention Clinic

[*Continued from page 44*]

the plane in land miles such a device would be better on a plane than on an auto because you don't care if you are a quarter mile or so from your destination. On an auto map advance mechanism even a half block may send you off on a wrong road.

Frankly, the suggestion is not good yet. Perhaps it might be worked up when the perfect land-mileage speedometer for planes is developed.

Crust Buster

Ross Edwards of Lubbock, Texas, sends description, photos and diagram of a plow to be used for busting the crust which forms after heavy rains.

ANSWER: *You are to be commended for your thorough yet brief description and illustrative material, together with a sound understanding of a basic problem and an apparently practical solution.*

We would recommend a patent search which any patent attorney can make for you. We recommend that you protect the item if search reveals possible patentability. Further, we would advise that you set about manufacturing the items for sale just as you have made them. This appears a most economical form of construction. We suggest a form with variable spacing. We recommend improved and more dust-free bearings. In our opinion you can establish a reasonable market for this item.

Polarizing Glasses For Different Colors

Polarizing eye glasses which will transmit or cut off light of two different colors or regulate intensity and color at will by simply rotating the lenses, are described in U. S. Patent 2,298,058 issued to Edwin H. Land of Cambridge, Mass., and assigned to the Polaroid Corporation of Dover, Del.

The new rotatable lenses are superposed on the regular polarizing glasses, much used to cut off the glare of light reflected up from horizontal surfaces. The new lenses contain two polarizing films, with their polarizing axes crossed at right angles. Each is impregnated with a dye and polarizes only a particular color, instead of all colors or white light as is the case with the regular glasses.

Suppose the two colors are yellow and blue. When turned say to the extreme left, yellow light is transmitted, to the extreme right, blue is transmitted. Midway between, the light is neutral or without color. At other positions any desired degree of coloration for either color can be obtained.

Or suppose that one film is green and the other neutral. When the neutral film is crossed with the regular glass, which is also neutral, say at the extreme left, scarcely any light at all passes. As the lens is turned, the light becomes brighter and greener until at the extreme right it is fully green.

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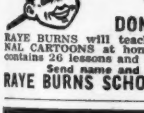

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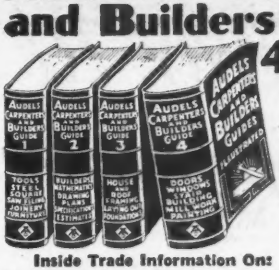

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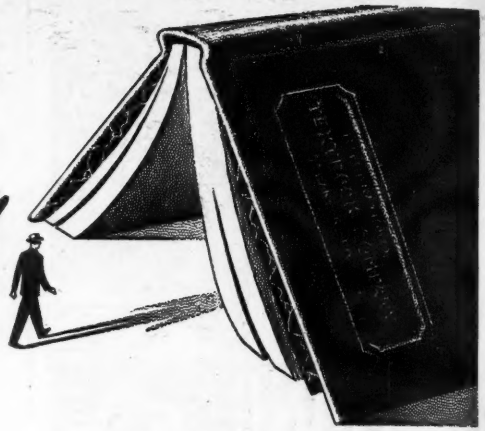

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NAVY tackles Mt. Everest

In an epochal 30-day experiment the Navy "climbed" two men "higher" than Mt. Everest—without oxygen.

By CAPT. J. H. KORB, U. S. Navy Medical Corps, as told to James Nevin Miller

SCIENCE now has proved that flyers and mountain climbers can reach altitudes of almost six miles, remain normal and alert, and come away none the worse for wear—without supplemental oxygen.

It is only necessary that they accustom themselves gradually to the decreasing pressures and dwindling oxygen.

For this discovery, of much value in the planning of future upper air explorations, credit goes to a pair of venturesome young men of the U. S. Navy —Lieut. (jg) Walter S. McNutt, Jr., and Carlton R. Morris, Hospital Apprentice. Under the supervision of Lieut. Cmdr. Charles S. Houston, U.S.N.R., a flight surgeon and authority on mountain climbing, McNutt and Morris tested for an entire month, in Florida, an odd sea-level combination of mountain climbing and airplane flying called "Operation Everest." The men lived in a compression chamber. They "flew" or "climbed" almost six miles without supplemental oxygen and suffered no ill effects. They reached a simulated altitude of 29,025 feet—23 feet higher than the unconquered peak of Mount Everest, the highest mountain in the world.

The program's purpose was to study the adaptation of the human body to slowly increasing anoxia, or lack of

Like goldfish the men lived, every motion observed from the outside by technicians who took notes and Navy experts who manipulated the chamber's delicate machinery.

oxygen. As a result of its findings it may be possible to reproduce artificially the necessary physiological changes in an aviator in order to "acclimatize" him quickly before he reaches the upper air.

At the start of the venture four Navy volunteers entered the pressure chamber at the Naval Air Station, Pensacola, for a month's exposure to the record-breaking conditions. Morris wasn't on the regular "team," but filled in when one of the original volunteers had to drop out because it was difficult to obtain arterial blood from his arm—one of the main tests needed to make the program a success.

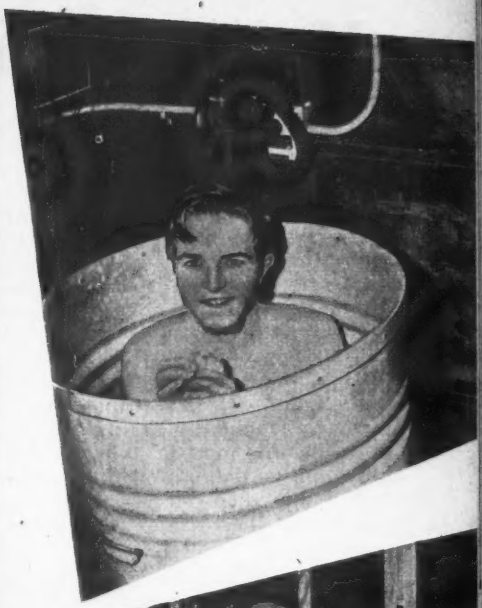
Morris and McNutt reached the "altitude" topping Mount Everest, remained there for almost 30 minutes and didn't lose consciousness.

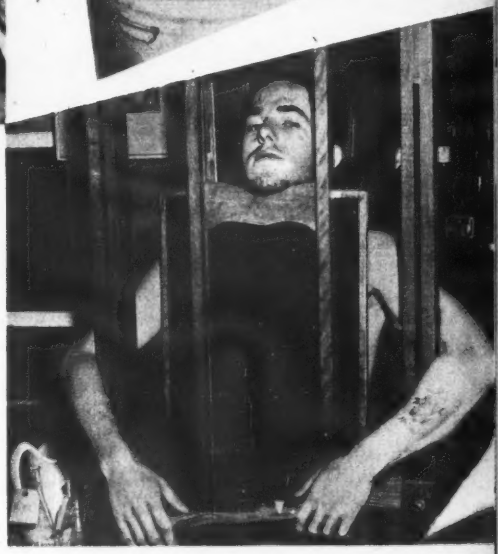
The two other volunteers blacked out after the chamber had passed 27,000 feet and were revived with supplemental oxygen.

During their month's stay in the laboratory chamber, the four volunteers were given the closest medical and scientific care and observation. Food was served them three times a day and they exercised on a stationary bicycle. They were shown movies each night. They slept on comfortable cots. They were under continuous observation.

Their day began at 6 A.M. when a technician entered the chamber through an air lock to record temperatures, blood pressures and weights. Technicians, doctors and researchers wore oxygen masks when entering the chamber, to prevent the mental confusion which normally results from lack of oxygen. After bathing in GI cans the volunteers had breakfast, then they underwent physical and psychological tests. Some of these tests were continued even after they went to bed. Special contrivances recorded the men's heartbeats while they slept.

There was a regular "climbing" schedule calling for the men to "go up" 2,000 feet a day for the first five days, 1,000





Health was carefully safeguarded. Above, Morris is being given a respiratory test by medicos who wear masks for supplemental oxygen; right, one of the lads is undergoing a periodic X-ray examination of his heart. Baths were a la GI cans.

feet a day from the sixth to the twentieth days and 500 feet a day thereafter.

Both men lost a little weight, but they emerged in tip-top shape, in large part due to strict diet control.

The test chamber was really something to see. It was of steel, about 20 feet long and perhaps 10 feet in diameter, with two doors about six feet apart in one end. Technicians and observers who entered the chamber did so by way of a small lock, remaining there until its air was reduced to the same pressure as that of the volunteers; and when they left the process was reversed. The chamber bristled with control appliances and was operated by a 14-man crew of experts.

It was interesting to watch McNutt and Morris as they "climbed" to their record-breaking height of 29,025 feet on the next to the last day. When they reached this height their blue complexions turned to a rather deep purple. (If this sounds a bit wild, let me explain that men start to turn blue in the face after they've been exposed to heights of about 13,000 feet without supplemental oxygen.) At this point they were breathing heavily and looked definitely uncomfortable; but they stayed there without supplemental oxygen for four hours.

Other high altitude physiological studies are sure to follow this initial effort, for with airplanes reaching ever higher speeds and altitudes, means must be found to live through the failure of pressurized cabins or oxygen gear.

Hottest Thing in Industry

BY LESTER DAVID

STOCKY John Bulkeley showed the world what a P-T boat could do to a Jap warship and the United States Navy was sold solid on the little torpedo sling-shots.

Messages clattered from the Pacific to the Pentagon in those early days of the war with Japan: "Give us P-T boats," the Admirals cried.

War production chiefs swung into action. Orders, triple-stamped with the highest priorities, whirled through the topmost echelons and shot out to the shipyards. Builders rolled up their sleeves and went to work. The Navy waited impatiently.

Time passed, the Japs swallowed up island after island in their seemingly inexorable sweep and again the admirals flashed Washington:

"Where are those P-T boats? For God's sake get them out here!"

Washington put the screws on the shipping men, the shipping men hammered at the builders, but the builders shrugged helplessly.

The bottleneck was plywood.

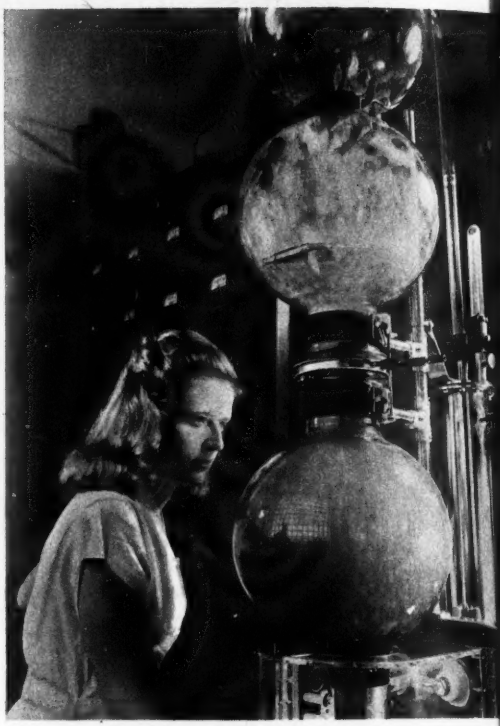
It took 16 hours for slow-heating steam platens to bind together the layers of birch veneer, and the delay resulted in production lags all down the line.

The builders appealed to the scientists. "Give us more heat," they pleaded—"more heat or quicker heat." And the scientists answered, "Why not try heating by radio frequency?"

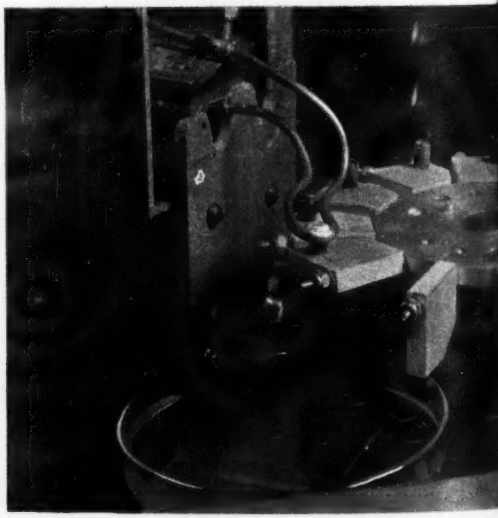
Why not, indeed? Radio frequency heating was in its scientific swaddling clothes then, but many a child has grown to swift maturity in war years, so RF was tried.

And RF slashed the total curing time of plywood down to four minutes!

The log-jam was broken and swarms of P-T boats went scuttling out to the Pacific—while back home the RF heating process was vaulted into the front ranks of the industrial big time as manufacturers who wanted "more and



A "radio heat" bulk reducer dries penicillin, cuts usual 24-hour operation to 30 minutes.



Radio frequency heating, new child of science, can cook your hamburger, bond plywood or harden metal.

quicker heat" harnessed it in their plants.

Industry's newest wonder boy is the hottest thing in the manufacturing field today. It has stuck out its tongue impudently at hitherto impossible tasks, and proceeded to do them with the calm confidence of youth.

It has helped create a vast variety of things ranging from the slot-machine hot dog—cooked in seconds while you wait—to impelling a near-revolution in all industries in which heat is an integral part of the manufacturing process.

Its achievements are manifold:

Item—It has cut the bulk reduction time of penicillin solutions from 24 hours to 30 minutes.

Item—It has reduced the curing time of foamex rubber mattresses from six hours to four minutes.

Item—It has made it possible to thaw bulk frozen foods in one and a half minutes instead of 24 hours, thereby allowing bakers and other large users to keep their production schedules flexible from day to day.

Item—It has created foot-thick plywoods—as compared with the one-inch ones made the old way—and the result has the tensile strength of 45,000 pounds per square inch but is only half the weight of the light metal aluminum.

Item—It has telescoped the drying of rayon thread, formerly done by hot air, from four hours to three minutes.

Item—It has solved the knotty problem of hardening gear surfaces beyond any danger of cracking while allowing the unheated cores to retain toughness and elasticity.

There are many more.

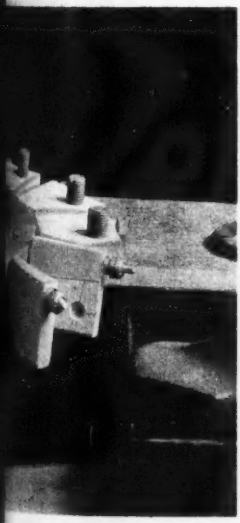
RF heat is generated by equipment closely resembling the transmitting unit of a radio broadcasting station, with one major difference: instead of being coupled to an antenna for utilization of its power output, the power it generates is fed instead into the material which is to be heated.

All RF heating is done in one of two ways:

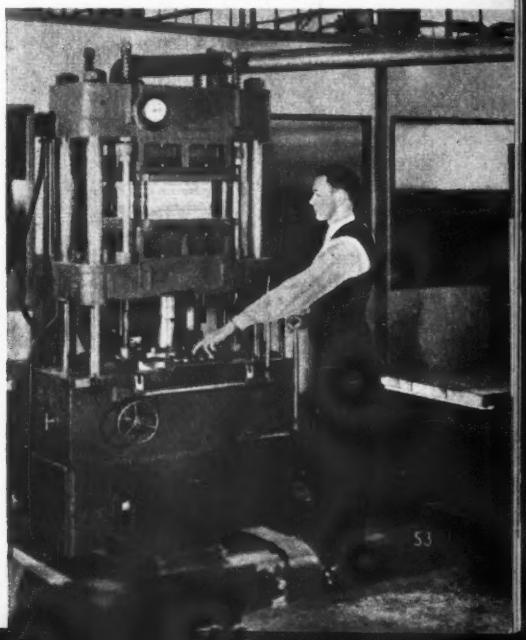
If the material requiring heat processing is a good electrical conductor, such as ferrous or non-ferrous metals, the heat is fed through an induction coil. And that's induction heating.

If the material is a non-conductor—plywood, paper, rubber, plastics, textiles—the feeding is done by a capacitor. That's dielectric heating.

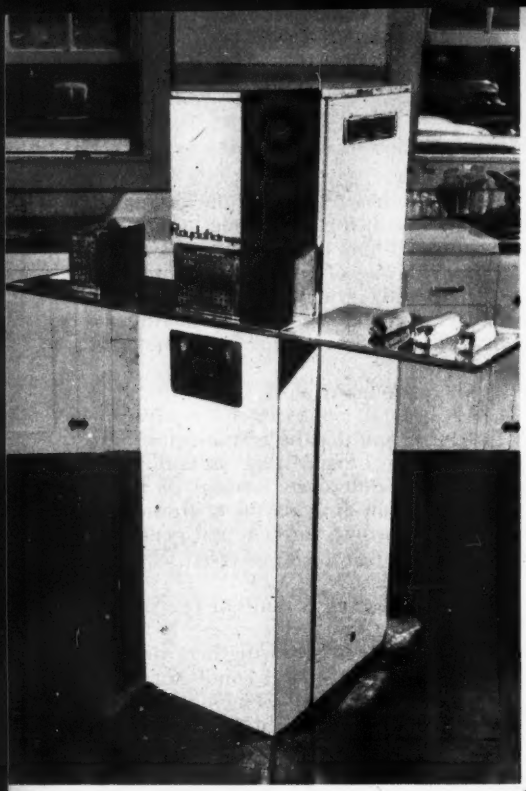
In induction heating an induction coil is used to transfer energy to a metallic material. This coil is usually just a few turns of water-cooled copper



Induction heating device hardens only the tops of these screws, left. Water cools them.



Ordinary heating bonds plywood one inch thick. Westinghouse unit, right, bonds 12 inches.



high frequency is used, virtually all of the current crowds to the surface and heats only the "skin" of the workpiece. What's more, perfect results can be obtained continuously.

Dials are set on an automatic timing device mounted on a cabinet. When the correct hardening temperature is reached, the power automatically clicks off, the material is released and drops into an oil or water bath for quenching.

Now take dielectric heating. It's done by means of a huge electrical sandwich—metal plates, or capacitors which carry the current, are the slices of bread, the non-conductors to be heated are the ham and cheese. As capacitor plate potentials change with rapid reversals of the applied RF voltage, the molecules of the material to be heated vibrate, first in one direction,

Raytheon Radarange occupies less space than refrigerator, grills hamburger in 35 seconds.

Airtronics machine, used to preheat plastics, can cook steaks equally well—in 20 seconds.

tubing electrically connected to a source of electronic power.

A button is pushed and high frequency alternating current flows through the inductor coil, setting up a magnetic field which permeates the metallic work material placed inside the coil for heating.

Now, electrical laws tell us that when a conductor is cut by moving lines of magnetic flux, a voltage is induced in it. Hence eddy currents flow around the rim of the metal to be heated, resistance is created, and the energy necessary to overcome this resistance appears in the form of heat.

Induction heating is swift and thorough and electrical engineers have perfect control at all times of the precise depth that the heat can penetrate any material. They can heat and harden objects to any desired depth and leave the rest comparatively cool and untouched.

This is possible because alternating currents can concentrate on the outside of a conductor. Thus when a

energy upon any food that is placed in an open "oven," and all the cook does is set a timer to the desired cooking time, then push a button. In a few seconds or minutes, at the expiration of the pre-set time, the unit shuts off and the food is ready for serving. The food is always cooked according to your setting of the timer. And it's always mighty good, too.

RF heating, which is starring in the reconversion program, is also starring in a 35-minute motion picture. Written and produced by George Blake for the Westinghouse Electric Corporation, it tells simply and clearly the role RF is playing these days to make industry turn handsprings.

Says bright young Mr. Blake:

"RF heating may not be a Van Johnson, but he's just as hot in his own little way."

RCA electronic sewing machine "sews" plastic materials, making tight, rip-proof, welded seam.

Speedy-Weeny by Radio Chef, Inc., stocks 300 "hot dogs." You get your fido in 20 seconds.

then in the other. This molecular agitation produces heat.

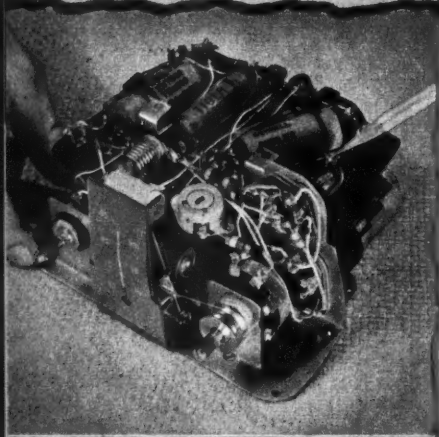
Thus the higher the applied alternating voltage and the higher its frequency, the more the molecules bounce around and the hotter becomes the filling of the sandwich. Therefore dielectric heating is done in the stratosphere of high frequencies, up in the millions of cycles a second instead of thousands as in induction heating.

Dielectric heating spreads heat evenly throughout the substance. There is no spottiness, no burning of the outside while the inside remains raw, and this is vital in plastic moulding, plywood binding, textile drying and rubber curing. The result is flawlessly uniform because the molecules in the center of the material being heated are shaken back and forth by the alternating current just as hard and fast as those on the outside.

Just as uniform is the cooking of foods in the new Raytheon Radarange, an electronic range soon to be put on the market. A magnetron tube beams

With an electronic blanket you'll remain all night at your favorite temperature.

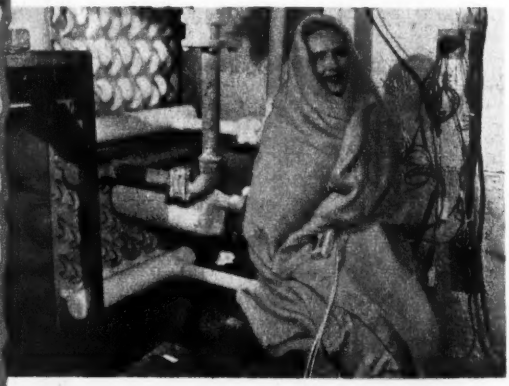
Electrons Go To Bed



The Simmons control unit contains a relay and three tubes. Pencil points to a Thyratron protective type tube which assures that failure anywhere will not create a hazard.

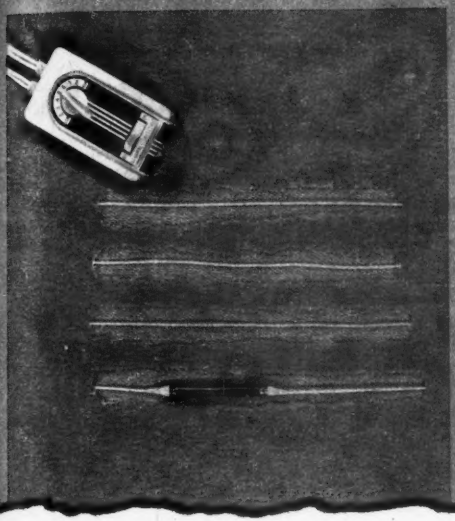
NO MORE clammy sheets. No more ice in the bed. No more flannel pyjamas. No more cold feet. No more midnight shivers looking for more covers. No more! The Electronic Age has produced the Electronic Blanket.

The electronic blanket looks like an ordinary woollen one of good quality, but hidden inside there's a pair of flexible wires that go up and down and all around. One is a warming element, the other a temperature "feeler" that governs the degree of warmth of the blanket. Operation is automatic, through a small bedside control.

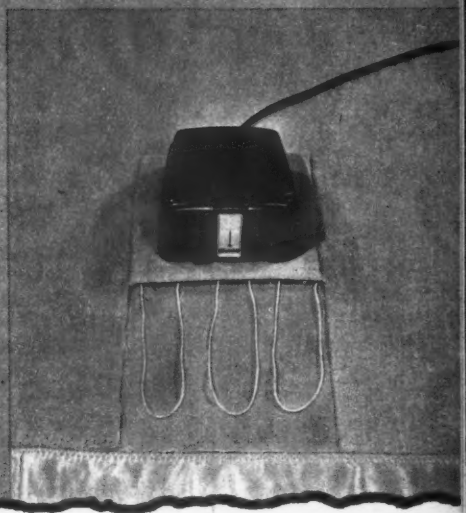


Pretty gal, about to take an eight-hour sleep test at the General Electric laboratories in a room cooled to 40 degrees. The GE blanket is controlled by an outside thermostat.

A cutaway view showing one of six auxiliary thermostats used in the GE electric blanket.



The temperature under a Simmons blanket is kept within one degree by a "feeler" wire.



When set for, say, 81 degrees, the feeler wire lets the blanket come to that temperature, then sends an electronic impulse to the control, causing it to cut off the current. When the temperature falls a degree the feeler causes a resumption of the warming flow. So—the warmth under the blanket is kept uniform at the temperature you preselect, no matter how the room temperature may change during the night.

It's all the cover you need. It's foolproof. It's launderable. It was developed by the Simmons Company, who want us to be comfortable in bed on cold nights.

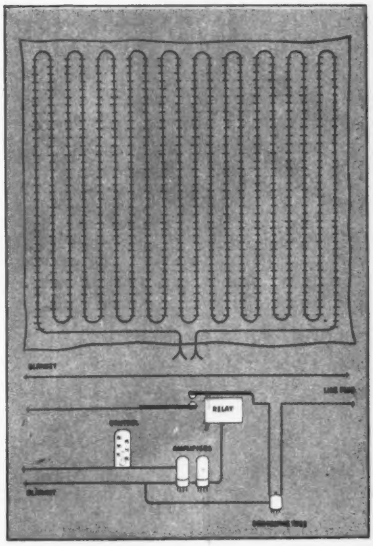
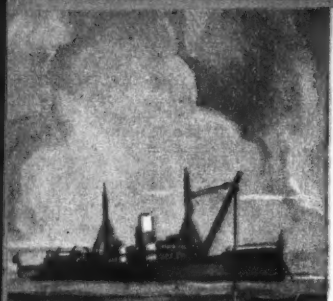


Diagram showing how 205 feet of Formvar insulated wire is laid in the Simmons blanket.

The electronic blanket is easily washed by hand with lukewarm water and a mild soap.



BEEBE BATHYSPHERE SUSPENDED BY CABLE REACHED A DEPTH OF 3,028 FEET

DOWN GOES PICCARD!

Yes, he'll go down four miles BUT - - - will he come back up?

THE African sun slants its dawn rays across the Gulf of Guinea. From the deck of a ship a huge crane swings out over the water. Slowly it descends and with scarcely a ripple deposits the amazing Thing on the ocean's face.

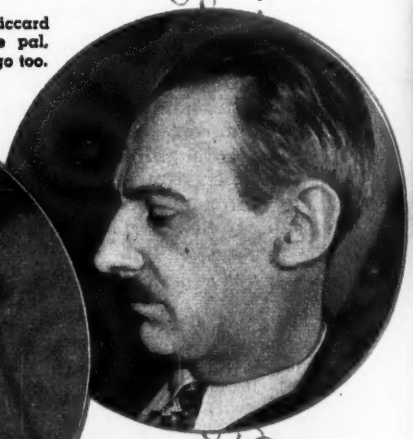
Inside the Thing a little man with wide, metal-rimmed glasses orders crisply: "Cut the ropes," and the world's strangest submarine, its only contact severed, begins it's descent into the world of endless night in the ocean's depths. Through the portholes the light of day fades quickly. The zoologist, the little man's only companion, peers outside, scribbles his observations. Time passes.

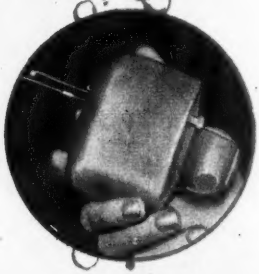
The free swimming submarine is now miles below the surface, in the heart of the black deep which two powerful arc lamps turn into a wonderland of marine fantasy. A dozen hours have elapsed. His studies complete, the professor presses a switch and. . . .

But here this narrative must stop.

Up to this point we know what will happen when the little man, who is Professor Auguste Piccard of stratos-

Beebe used a cable, Piccard won't. His stratosphere pal, Max Cosyns, right, will go too.





When Piccard, above, drops ballast, his sub—see model, right—will bob to surface—he hopes.

PICCARD SUBMARINE GOAL FOUR MILES DEEP

phere fame, makes his fateful experiment.

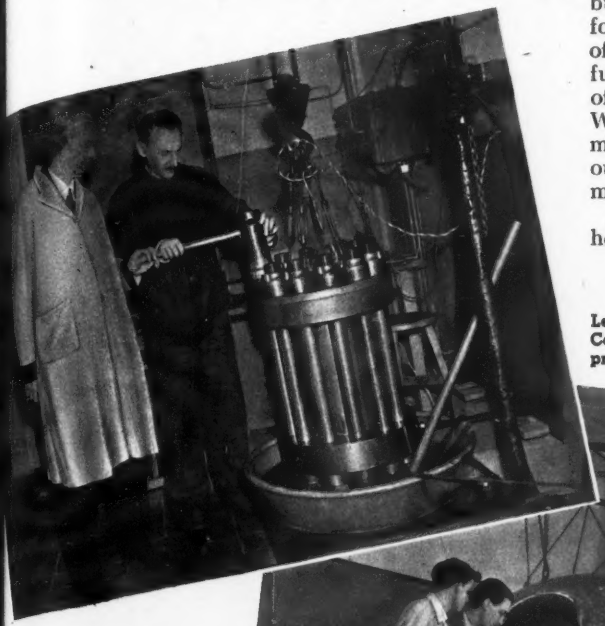
But will his invention, upon which he has worked for years, rise to the surface? The professor himself does not know. The answer will be flashed to the world from the west coast of Africa on a February morning when the professor attempts to descend four miles into the ocean, far deeper than the present record of 3,028 feet held by Professor William Beebe.

The steel sphere in which Piccard will make his perilous journey into the unknown weighs ten tons, is nearly seven feet in diameter and has walls three and one-half inches thick. Nevertheless, without ballast, it is lighter than sea water, and therein lies the professor's hopes.

Without the lighter-than-water twist, the bathyvessel would plummet into the sea and be lost forever. For there will be no cable, such as was used by Beebe, to haul it back to the surface. A cable would permit Piccard's sphere to dangle no deeper than Beebe went . . . if he went further the weight of the cable would almost certainly cause it to snap.

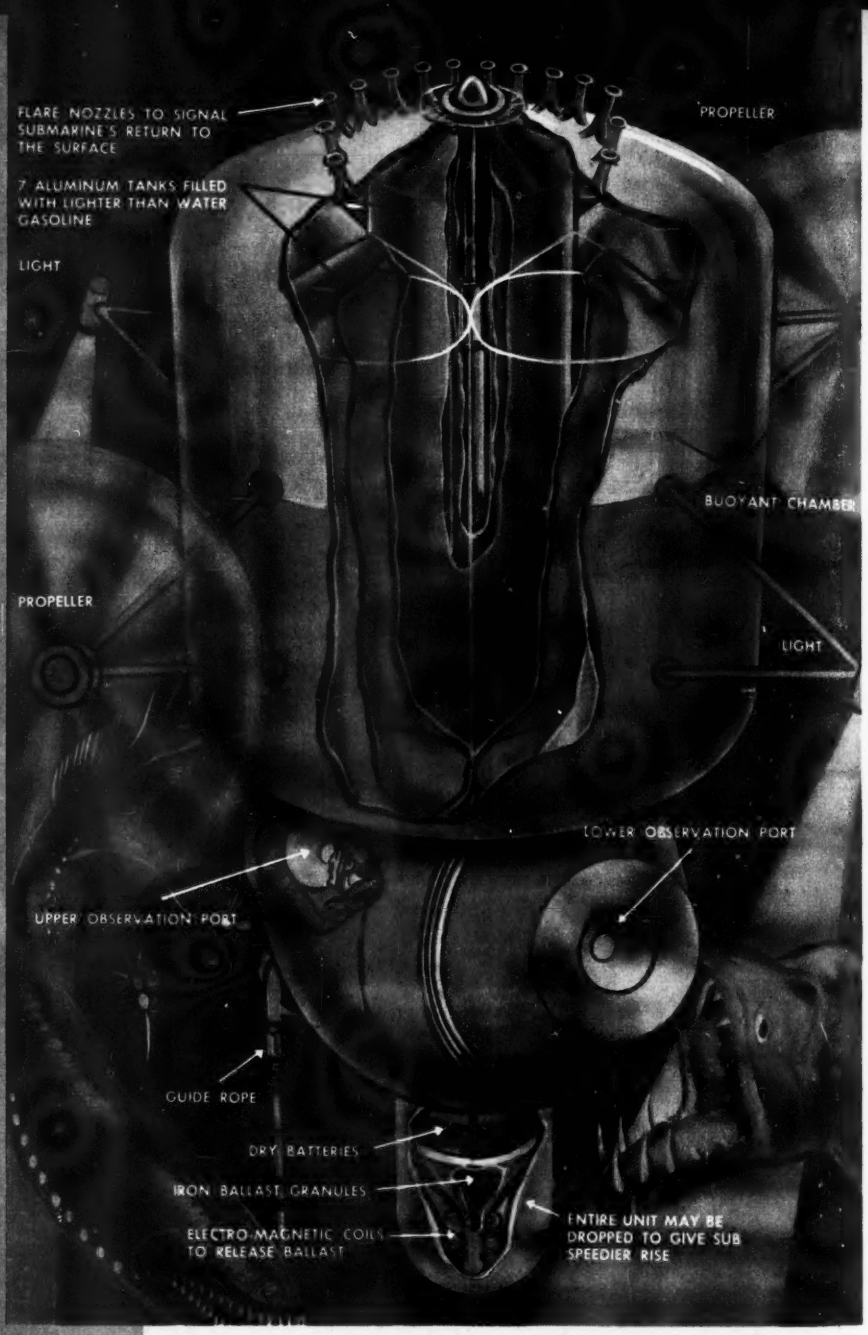
Piccard hopes to rise again through applying the balloon principle to his queer submarine. To the sphere Piccard has attached a boat-shaped float filled with 494 cubic feet of a light, buoyant oil. This takes the place of the hydrogen gas bag on a balloon. Below it, held tightly by electro-magnets, are large chunks of iron ballast. If a speedy ascent is demanded, these large pieces of iron can be released, but the professor has arranged for a slow, controlled method of rising. In a large copper funnel he has placed hundreds of pounds of iron filings. When current to the electro-magnet is cut, the filings flow out at the rate of 60 pounds a minute.

There are two plastic portholes, six inches thick, on each



Left: In this tester, Piccard and Cosyns give their model 3,000 lbs. pressure. It hasn't broken—yet.

After Piccard went up five miles in his balloon—cabin, right—he promised his wife he'd never go stratosphering again. Stuck with that pledge, he'll go four miles underwater.



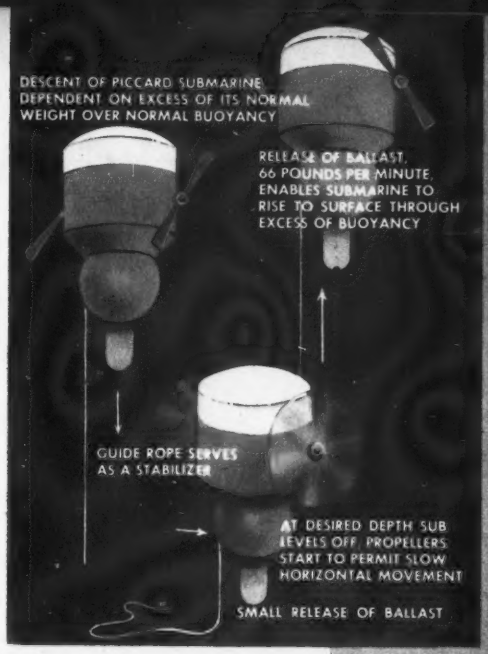
side of the cabin. One is for photographic equipment which will automatically snap ten pictures per second, and the other will be used by the two men for observations.

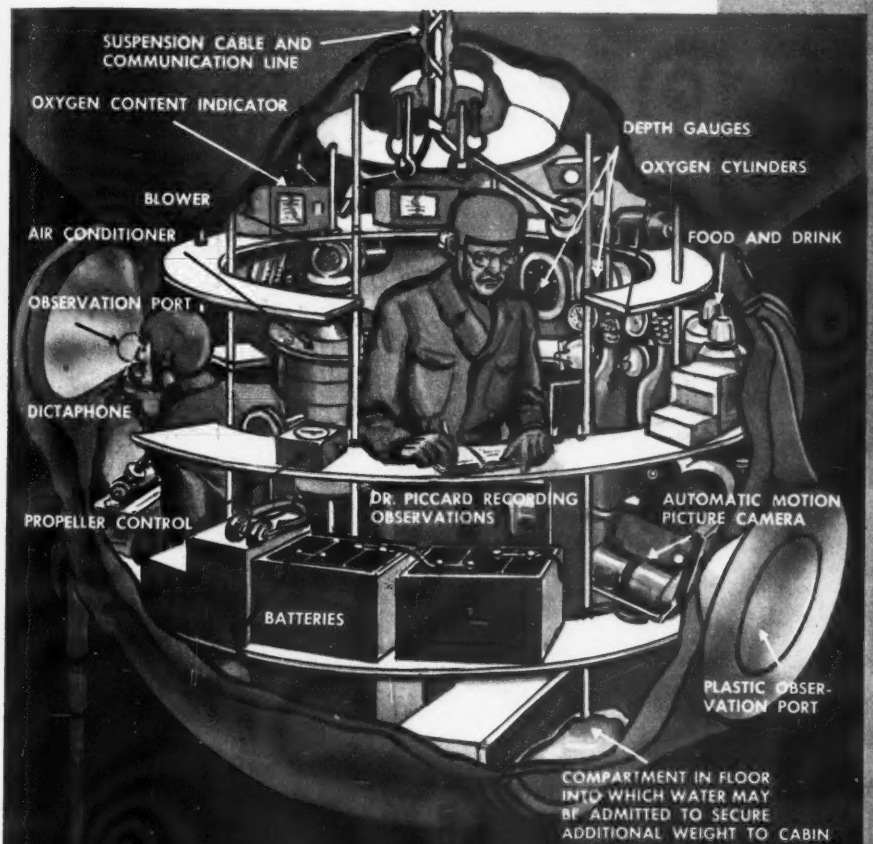
To pierce the gloom of the deep, Piccard has attached 3,300 candlepower arc lights in such a way as to produce streams of light which will cross the axis of the portholes perpendicularly. And he has provided two electrical motors which will

move the sphere forward or backward. The speed will be low, about five inches per second.

Professor Piccard hopes to enrich immeasurably science's presently limited knowledge of the ocean's depths. Virtually all that man knows has been gleaned from the admittedly unsatisfactory soundings and net castings from surface ships. Divers have not been able to go deep enough or stay long enough. Beebe alone has ventured down but, thinks Piccard, not far enough.

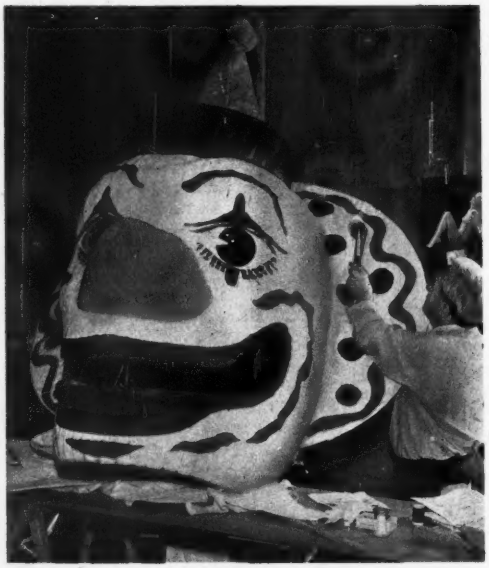
And so the eminent professor, who was the first to soar ten miles into the stratosphere, is poised to set another record, destination downward—round trip preferred. February will tell.





gimmicks for CLOWNS

Come on kids from eight to 80 years old, let's go behind the scenes at the circus with the "gimmick" man.



THE lions roar. The bareback rider whirls 'round the ring. High above, the trapeze artist does the triple flip. But it's the clowns who get the laughs.

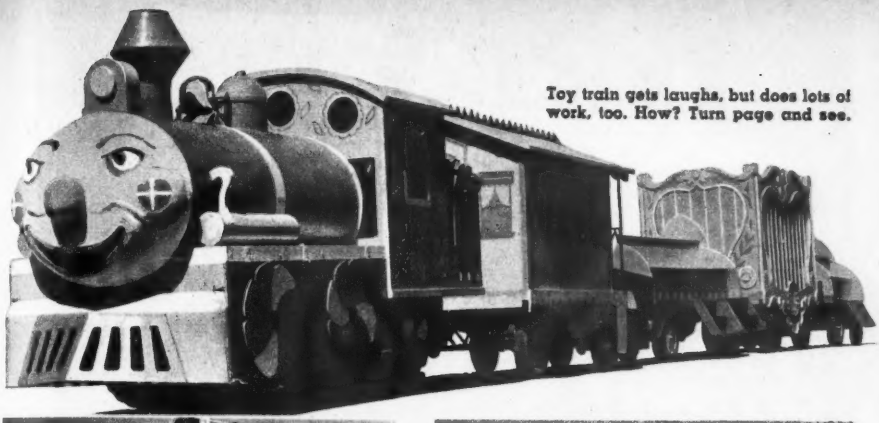
Here's one dressed as an enormous rooster, laying an enormous egg. From the egg pops a barking fox terrier. And there's 6-foot clown Adam going into the Adam Smasher. Boom! Smoke pours out—he's a goner sure! Then out spring four midget clowns.

The crowd roars. But it's not easy, getting these laughs. There's a lot of ingenious thought, and a lot of work making the props and costumes called "gimmicks."

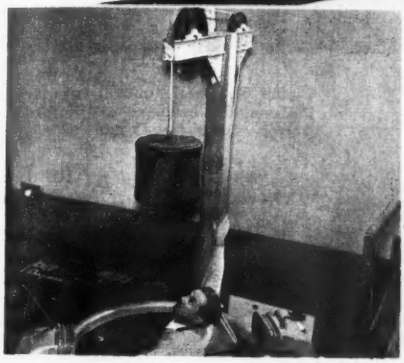
Shown here are Paul Jung's, of Ringling Bros., Barnum & Bailey.

Real feathers adorn this 100-lb. gimmick, the rooster costume. Note Rita, the trick terrier, getting all set to be "hatched."

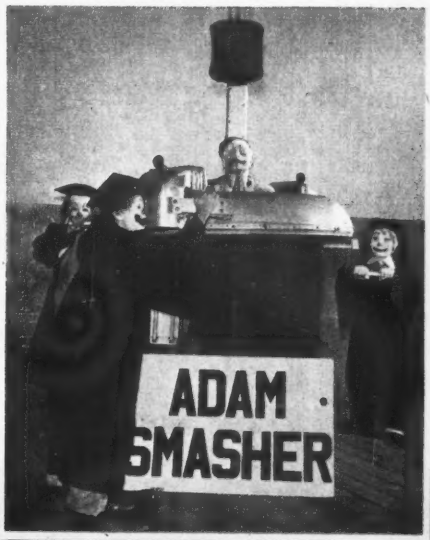
Guess who wears that huge mask at left. The world's biggest clown—the elephant!

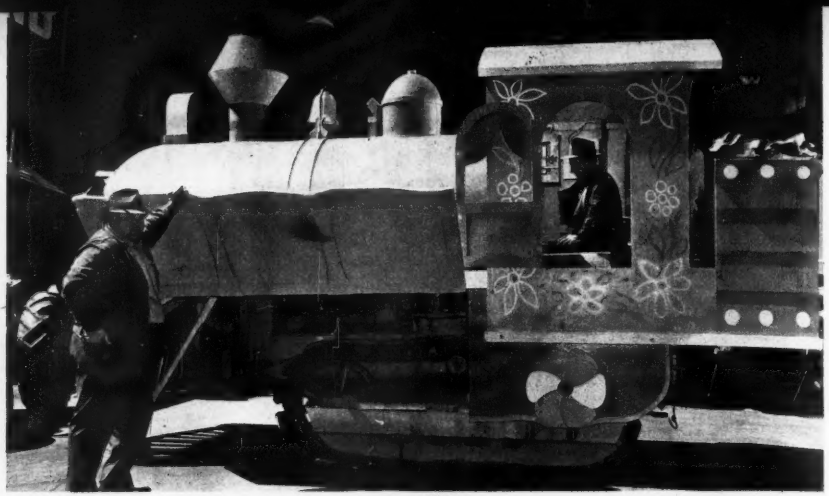


Toy train gets laughs, but does lots of work, too. How? Turn page and see.



Paul Jung, above, dreamed up this hilarity. When that awful hammer (light as a feather) "smashes" Adam, four midget clowns pop out, below.





Circus engineers, above, reveal the serious business—a Diesel tractor—under the laugh train.

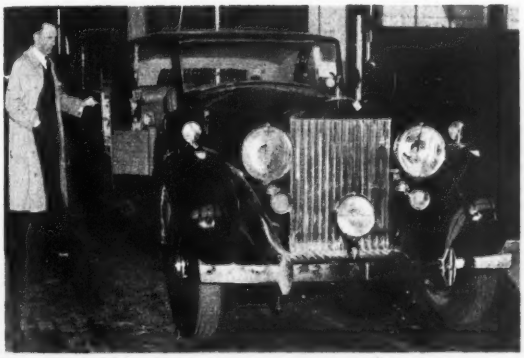
Photos by Globe

Plop goes the protesting midget into the laundry tub. Below: Out he comes, washed and ironed—and flat as a nickel pancake.

Endlessly people keep asking, "Why are the foreign cars better than ours?" Here is the true dope.

BY TOM McCAHILL

How Good Are the *Foreign* Cars?



Above, a luxurious prewar Rolls Royce, with radical doors that in opening slip toward the rear, parallel with the car. Below, a postwar Skoda.

WHICH are really the best?" I've often been asked, "American or foreign automobiles?" And readers have written and asked flatly, "Why is it we can't build as good cars as they do in Europe?"

If you have been around automobile enthusiasts, you know that arguments on this subject have been going on for over 30 years. There is only one truthful answer when asked if imported cars are better than ours, and that is, "Yes and no."

I will explain. I have never felt more qualified to write any article than I have this, because I don't believe any one in this country has ever, over a period of years, personally owned more imported cars of various makes than I have, in addition to owning cars made by every leading manufacturer in this country.

In America today we only build one type of car, the American family car. In Europe there are two distinct

An Alfa Romeo car, with body by Roggemans, exhibited in Brussels in the first display since 1940.

types and a hybrid—the family car, the sport car and the semi-sport car. The family car, like ours, is designed for family use, and the sport car is designed primarily for sport driving and contests. Now, don't start hollering that some of our American cars are sport sedans or sport convertibles, because this is only a stretch of the manufacturer's imagination. There is no such thing as an American sport car being made today, outside of race cars. The "sport"-labelled convertibles we make would show up like battleships in the Gold Cup races in a real sport event. Are they better? No. They are different. But, as we are comparing our one type of car with their two and a half types, let's make the comparisons one at a time.

First, let's compare their family car to ours. Are the cars the same? For the most part, no, and for good reasons. In Europe the price of gasoline averages four to five times more than here, so that economy becomes a much more important factor that it does with us, and the manufacturer catering to the low-priced-car buyer must stress economy of operation. To accomplish this he must sacrifice some of the features our manufacturers shout about, such as performance and horsepower and roominess. And what have they given in their place? Usually workmanship and quality. These are far superior to ours. The doors of their low-priced cars fit like the doors of our expensive ones, and the assembled parts in general are of a much higher quality than those we turn out. The upholstery is often genuine leather of the finest quality, even in the cheapest cars.

So, how do the products of America and Europe stack up? Does the little, jewel-like car of superb workmanship surpass our big, low-priced cars put together for the most part by stamping machines? The answer is still, "Yes and no." Yes, they are a much better car to own in a country where gasoline costs around a dollar a gallon, and they are just as sensible to own where the majority of roads are narrow and winding and where excess horsepower couldn't be used in safety anyway. For this type of driving, typical of European conditions, the fine little continental car seems the best.

But for America, no. This car is not for the American driver who thinks nothing of driving 400 miles in a day's run, in contrast to most Europeans who couldn't drive 400 miles from the center of their country without crossing an international boundary line! Nor is it for the American business man who has a lot of stops to make and must travel fast re-

This queer-looking P.L.M. job shows the latest trend in Belgian cars. It looks like a two-family affair!

gardless of bad road conditions. The American driver wants comfort for his family, horsepower and snap for his long trips, and a car that can be used 365 days in the year irrespective of location or weather. For Americans, no other car in the world will give the service we get out of our own cars today.

"Hold on," you say, "how about the big foreign cars such as the Rolls Royce, Minerva, Hispano, Lanchester or Bentley?" My friends, now you are thinking about the world's unquestionably best-built automobiles, but these are strictly luxury products. There isn't an American car that can hold a candle to any of them from the standpoint of workmanship and comfort—but then, look what they cost! and remember I just said best-*built* automobiles, not best automobiles for Americans. These cars are made to give years of service and in this nothing we build can approach them. I could take you in front of the Plaza Hotel in New York or the Breakers in Palm Beach and show you quite a number of cars of this type ranging in age from 20 to 25 years and they'll all look like new and be in perfect condition; but think how many Cadillacs you could have owned in this time for the $20,000 one of them would have cost you, delivered here! If we are not considering price, only quality, then the Rolls must get the nod, even though a Lincoln or Cadillac would beat the pants off it in a performance test.

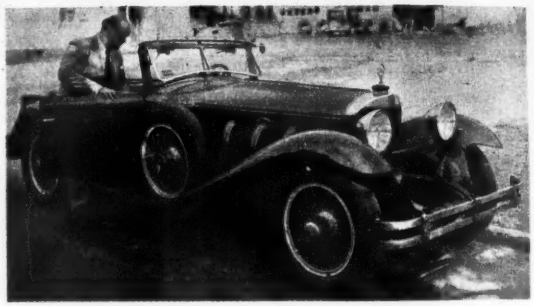
What really starts all these "Which is better?" arguments is the contest between the American (all purpose) car and the foreign

Front of a 200-hp 1933 Maybach; cost $10,000.

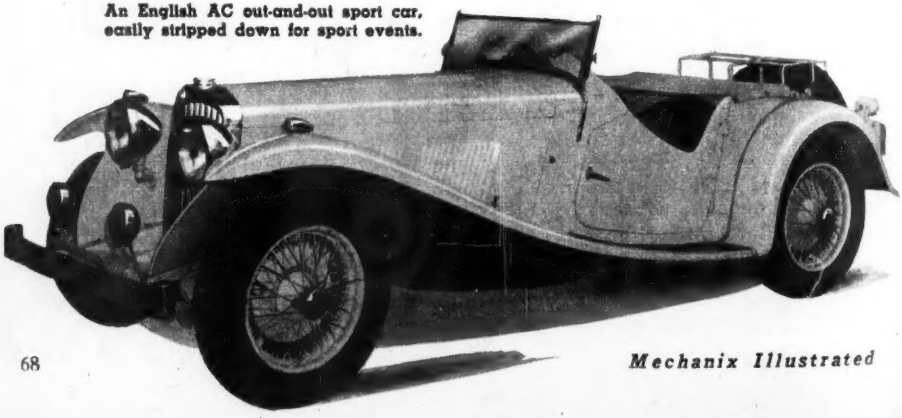
sport car. The foreign sport car is primarily a racing car—meaning road racing, not track. In performance it is so far superior to the best American stock car that comparison is ridiculous. These cars run in price from the poor man's sport car, equal to our low-priced machines, to the double SS Mercedes Benz which costs from $20,000 up. They are usually so underslung that in getting in you feel as though you were getting into bed, but they are often much longer in wheelbase than some of our largest limousines. For the most part the expensive sport cars are supercharged, and the great majority are either four-place open phaetons or roadsters, which doesn't assure much comfort on a sub-zero night unless you are an Eskimo. About the performance difference: when you hear an American car owner brag that he was doing a hundred you may rest assured he's either stretching the truth to the breaking point or he has a very slap-happy speedometer, but when you hear about a Talbot, Mazzaratti, Alfa Romeo or Mercedes Benz doing close to 150, don't smirk, because they can do it. If you owned one of the fastest American stock cars and the owner of a Bugatti, for example, offered to bet you that on Park Avenue, New York City, he could go two blocks from a dead standstill while you were going one, don't bet him, because you would lose. These cars are supercharged dynamite that can whip up close to a hundred before you get out of second, and if it wasn't for the law they could do 20 laps around Central Park before you went 10. Does this make them better, you ask? The answer is, far better *for this type of driving.*

Just a few [*Continued on page* 163]

The French-built Renault, above, can do better than 40 miles on a gallon of gas. The SS Mercedes Benz semi-sport convertible, below, is a supercharged job that will easily top 125 mph.



An English AC out-and-out sport car, easily stripped down for sport events.



BY DON ROMERO

Bank Your Furniture

You lock your chairs and sofas in a portable vault and they're not touched until you want them back.

"SURE. Chairs, sofas, rugs, beds, lamps . . . I'll put the whole works right in a safe deposit box."

I had merely inquired where he was going to store his furniture when he left his New York apartment.

"In a what?" I asked.

"A safe deposit box. Like what you find in a bank. Only bigger, of course." He smiled at my astonishment.

"And the service," he went on, "is better. When you deposit valuable papers in a safe deposit box in a bank, you have to go to the bank to do it. When I deposit or withdraw my furniture, they bring my safe deposit box right up to my front door. Stick around and you'll see."

A few minutes later a truck drew up in front of my friend's apartment house. Riding on the chassis was, sure enough, a safe deposit box. A big, shiny, steel one. Within an hour the truck's three-man crew finished loading my friend's furniture.

One of the men handed him a heavy steel lock and a key, and we went out to the truck. After carefully checking to see that all his furniture had been "deposited," my friend closed the steel doors of his safe deposit box, secured them with the lock, turned the key in the lock, and put the key in his pocket. He gave the truckman a specimen of his signature, and a moment later the truck was rolling down the street.

I took my friend's arm and headed for a taxi. "I've got to see the rest of this."

A few minutes later we drew up at the entrance of the Portovault Storage Company. President of the company, Chester A. Young, was most obliging.

"You're just in time to see your safe deposit box being stored in our bank," he said.

He took us to the rear of the storage house where the truck was just backing up to an unloading platform. One of the truckmen quickly released two catches at the rear of the truck and one at the front. A moment later the safe deposit box, which rested on steel ball-bearing wheels, was pulled off the truck's chassis by a small electric motor and onto a movable platform whose wheels ran on steel tracks embedded in cement.

Two men pushed the movable platform along a short stretch of track, and into an elevator. Mr. Young invited us along for the ride and as we ascended, he pointed to the number painted on the safe deposit box: 835.

"Every deposit box is numbered," he explained. "That number, 835, means that this box belongs on the eighth floor in slot number 35."

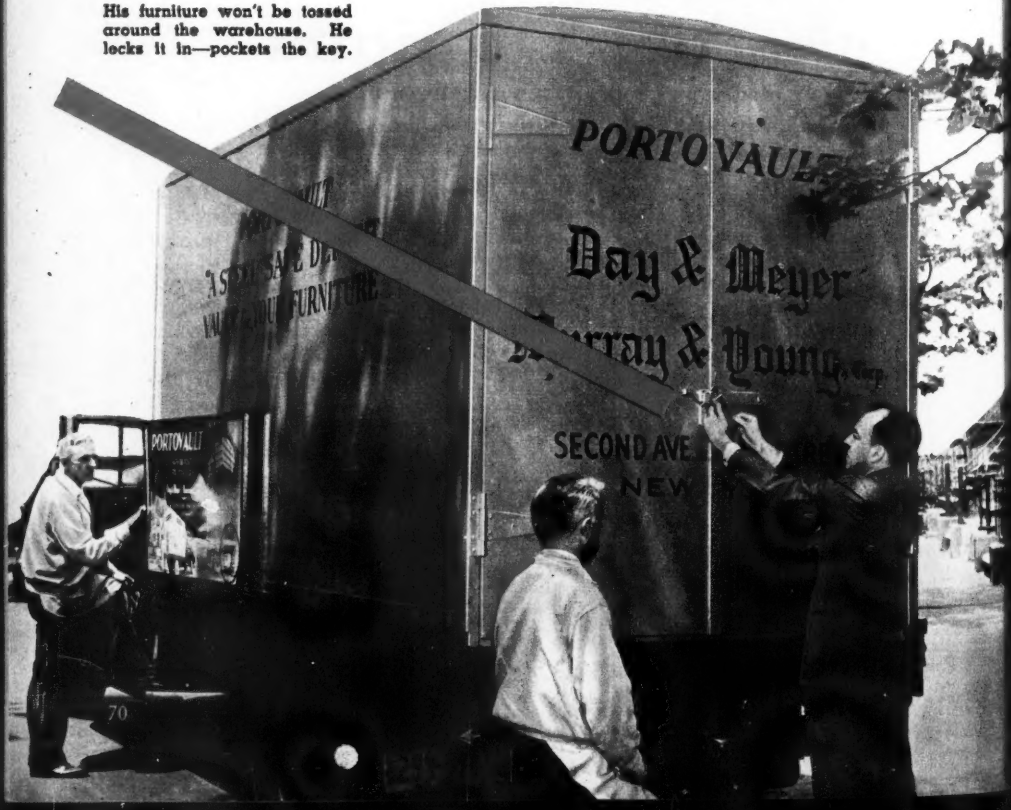
At the eighth floor, the movable platform, again moving on concrete-embedded steel rails, was pushed down a long aisle which was lined on both sides with safe deposit boxes. Arriving at an open spot, the deposit box, now moving on its own wheels, was quickly rolled into "slot 35."

"That's all there is to it," said Mr. Young. "Your furniture has now been deposited. You have the key to your deposit box and you're the only one who can get into it. And you can get into it only if your signature checks with the one we have on file. You see, it's just like a bank."

Thirty years ago Chester Young, taking his idea from the safe deposit box service offered by most banks, borrowed 300 dollars and started up his own service for people who wanted to "bank" furniture. Today his 10-story vault, with its 56 safe deposit boxes on each floor and its three miles of steel track, is doing a business of about a quarter of a million dollars a year.

In starting up his business, Young set out not only to provide a better type of storage service but also to develop a time-labor-money-saving method of operation. He has attained his objectives in a number of ways. Although he has a total of

His furniture won't be tossed around the warehouse. He locks it in—pockets the key.



560 safe deposit boxes, or the equivalent of 560 moving vans, he needs only three trucks to keep these boxes moving in and out of his "bank."

In the case of a conventional moving van, it takes three men about two and a half hours to empty a full van and store its contents in a warehouse. Under the Young system, a safe deposit box can be taken off a truck and moved into its slot in exactly nine minutes. Whereas a conventional van obviously cannot be used for hauling during the two and a half hours it is being unloaded at the warehouse. Young's trucks can drop a loaded deposit box at the "bank," pick up an empty deposit box, and be off to another hauling job all within four minutes.

Weighing 1,500 pounds empty, and made of riveted steel plates, one-half inch thick, each safe deposit box is about 11½ feet long, seven high, and six wide, and has a capacity of 500 cubic feet. In addition to being water-moth-dust-termite-moisture-and-fire-proof, the boxes are also almost airtight. Because of this unusual protection, they are often employed for storing such contents as rare books, valuable records, documents and paintings. Young now has about $80,000,000 worth of rare art objects on deposit in these two vaults.

Perhaps Young's most novel idea on storage is his contemplated plan of starting up a "branch-banking service." By opening storage houses throughout the country, he would enable a client to deposit his furniture in one city and withdraw it in another.

Do furniture deposits draw interest? "Certainly," says Young. "Leave them long enough, they become antiques."

The entire portovault is stored until the owner is ready to "withdraw his deposit."

The whole works goes onto rails in the storehouse—the truck is off again in only four minutes.

Each safe deposit box goes into its numbered slot in the furniture bank—no storage handling.

Ice

CROW'S NEST WITH PLEXIGLAS TOP

PROPOSED HELICOPTER FOR SURVEYING ICE FIELDS

ENGINE ROOM

PORT OUTBOARD TANKS

PUMP

PUMP MOTOR

BULKHEAD

14-FT. DIAMETER STARBOARD PROPELLER

STARBOARD OUTBOARD TANKS

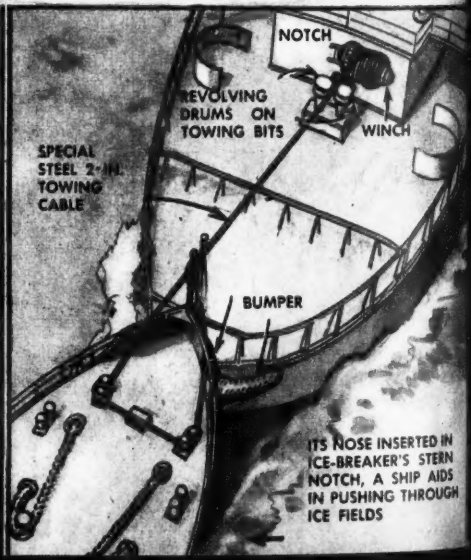
TRANSVERSE DUCTS DISCHARGING WATER INTO STARBOARD TANKS

PUMP

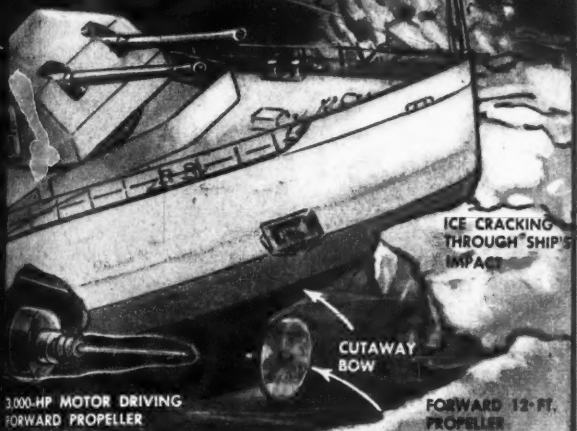
DOUBLE HULL

FORWARD ENGINE ROOM SHIP HAS SIX 2,000-HP FAIRBANKS-MORSE DIESEL ELECTRIC ENGINES

IT CRUSHES through the frozen harbor like an ice-eating behemoth, rolling from side to side as 240 tons of water shift from port to starboard and back again. Two giant propellers drive the monster forward, while a bow propeller churns beneath the surface, drawing water from under the ice flow causing it to sink and crack. If progress halts, the nose propeller reverses action and drives water upward, lifting and breaking the ice. And if need be, the ice cracker can even lift its massive bow and bring down a crashing blow. Developed by the Coast Guard, the ice cracker fumes and growls around the ice-bound harbor. In its wake, ships move again, trade and commerce—thanks to science—resume.

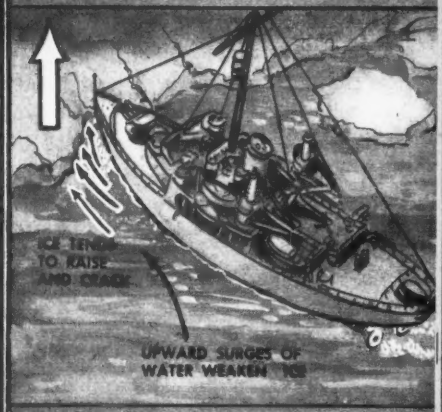


Cracker



A WIND CLASS ICE-BREAKER IN ACTION. OVERALL LENGTH, 269 FT.; BEAM, 64 FT.

The powerful 12-foot forward propeller draws water from under the ice flow, causing it to sink and crack . . .



. . . or, above, it can reverse action and drive water upward, lifting and breaking the ice jam. Model is shown below.

Ace in the Sky

I'm sore! I got to be a pilot the hard way. Now—with these new controls—even Grandma can fly.

BY C. B. COLBY

I TELL you it's a conspiracy!

It took me plenty long to learn to stagger around the traffic pattern and down again in a J-3. Next I tried the old pre-war Skyfarer and got so I could handle that pretty well. Then I got in the easy-flying new jobs and finally began to call myself a pilot.

But now look what they've done! Just when I've mastered (okay, it's a matter of opinion) the standard stick and rudder pedals system and the two-control type, along comes an entirely new system and now my 80-year-old grandmother can learn. It's that easy.

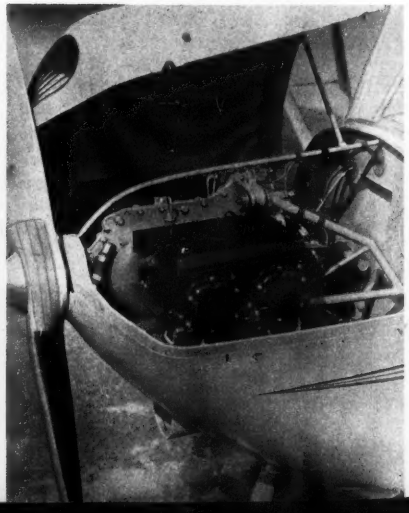
Fortunately, the new system has only appeared in England as yet, so I may be safe for a few more months. I'm referring to the new Chrislea "Ace" designed by R. C. Christofoides of England.

Combining the very old with the very new, this four-place personal aircraft has, without a doubt, the most unorthodox control system presented in many years.

The Ace's control surfaces themselves are of conventional design and location

It's as comfortable as a baby carriage—and look at that visibility! Remember the old jobs?

Mechanics won't get stiff necks getting at the 100-horse engine, either. It's shoulder high.



about the airframe itself. It is the design and manipulation of the dual control-wheel columns that is unique. There are no foot pedals with the exception of a brake pedal for either pilot to use and a foot accelerator in addition to the hand throttle.

The dual control-wheel columns are universally pivoted at the junction with the instrument panel and do not push-pull as in American wheel control designs with which you are familiar. The action of the control will undoubtedly seem awkward at first glance—and possibly the second and the third as well.

The dual columns work in unison of course. Here's how:

To raise the nose you lift the entire wheel and column unit, pivoting it from the universal joint at the panel. This raises the elevators and of course the nose of the plane follows. This is in contrast to pulling the stick of the conventional aircraft back or pulling the control column of the "wheel" aircraft system out of the dashboard toward you.

To drop the elevators of the Ace and go into a glide or dive, you lower the entire wheel column unit from the same pivot. With the wheel and column horizontal to the center line of the fuselage the Ace flies level. Now then, to swing the rudder you move the column on the same pivot to port or starboard. This may be done no matter whether the unit is raised or lowered below the level flight horizontal position.

The ailerons are activated by the normal turning of the control wheel itself. (The designer must have everlooked a chance to do something new with that manipulation.) Combinations of these up and down swings and wheel rotations maneuver the aircraft.

Let's see what this means to a take-off for example. You are at the end of the runway and ready for take-off. You open the throttle, gather speed and start down the strip. You swing the control column left and right to keep the ship headed down the middle and then, while still swinging, you push down on the unit to raise the tail into flying position.

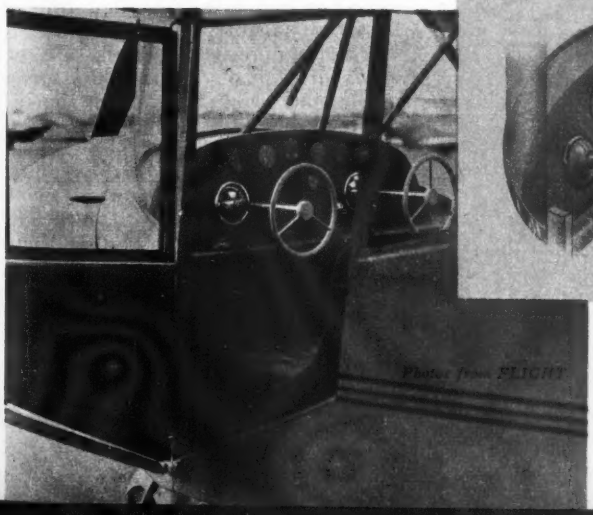
As your flying speed approaches you lift slightly, having returned the column to horizontal position to maintain flying position, and with a sort of "lifting yourself by your own boot-straps" feeling I imagine, you rise into the air. Now you return the column to horizontal position to gather more flying speed for the climb, and then later lift the column again to climb.

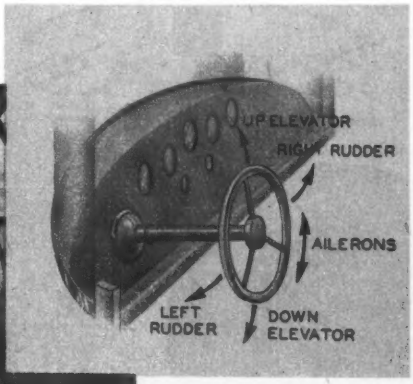
Beyond the limits of the field you start your left climbing turn into the pattern. You continue to lift the column, turn the wheel left for a slight bank and then swing the whole business to the left for a bit of assist from the left rudder. See what I mean now? It's a conspiracy!

In addition to the control system, the Ace's outstanding innovation, which time alone can prove or disprove as a boon to aviation, the ship has many other interesting points.

This high- [*Continued on page* 166]

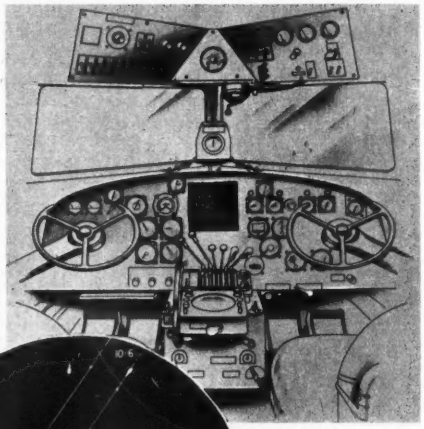
The dual wheel columns are not the push-pull type—they're universally pivoted at the panel.

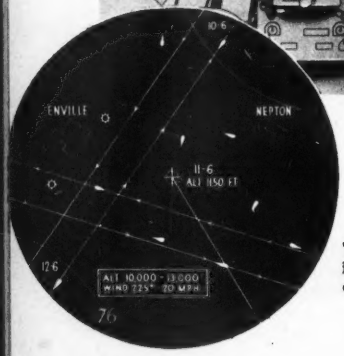




To go up, you lift the wheel up; to go down you push down. Think Grandma can understand?

Two miracles of science are combined to take the "blind" out of "blind flying."



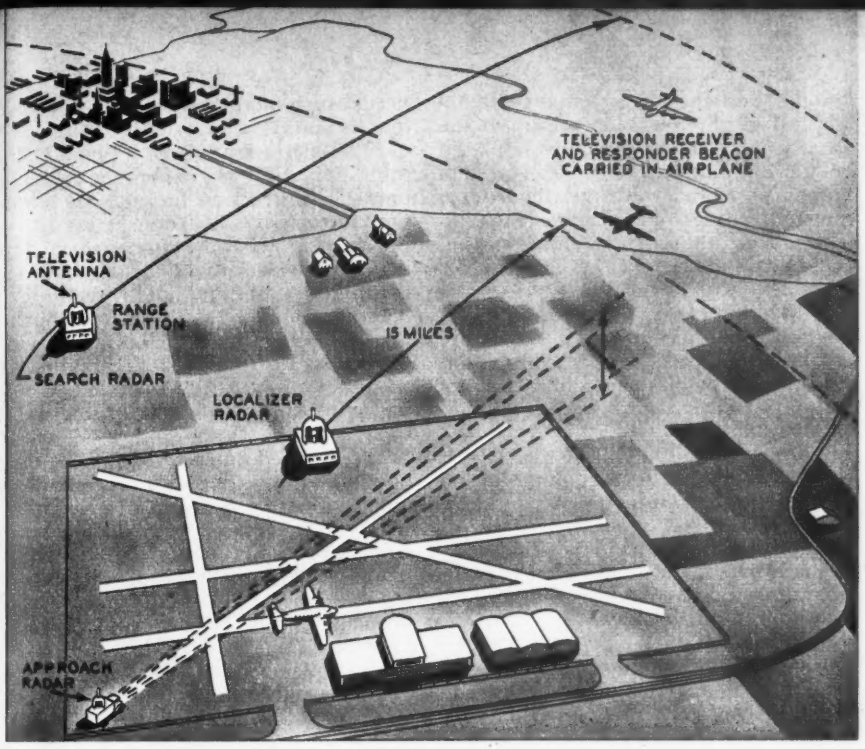


Teleran 7" screen is installed in center of panel. Image, left.

TWO marvels of the electron tube, radar and television, have now been joined to give eyes to the air pilot at times when he would otherwise be flying blind through fog, clouds or darkness. This new device, announced by Radio Corporation of America and called teleran, promises to banish the greatest remaining hazard to scheduled flying.

Radar on the ground is used to get a picture of everything the pilot wants to see in his vicinity, and this picture is sent to the pilot by television. On the screen in front of him the pilot sees a map of the terrain below with the airport runways and all stationary obstacles. Moving over this map is a dot of light for each plane flying in the vicinity, including his own. He knows his plane by a special line of light that identifies it.

Since a picture tells more than thousands of words, the information thus put before the pilot from the airport control station affords him the greatest measure of safety and sureness. He virtually sees all the planes with which he might



Teleran = Television + Radar

collide; knows their relative positions and the direction of their flight. He "sees" the airport with its runways clearly outlined. If there are tall buildings or hills, the radar spots them and shows them to him on his screen.

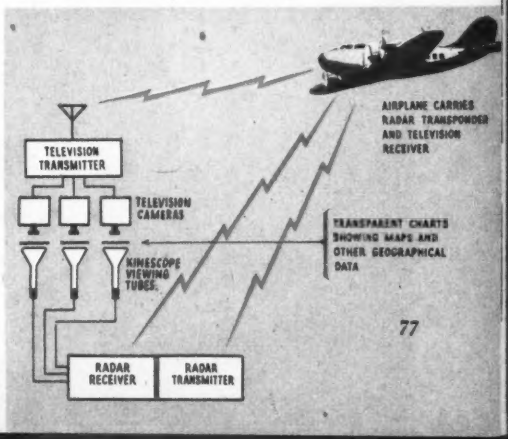
The plane itself does not have to carry around heavy and cumbersome radar equipment; that is all in the airport. The plane carries only a relatively light receiving apparatus. One radar outfit on the ground suffices to give pictorial information to all planes in the vicinity.

In announcing its development of this new aid to air navigation, RCA stated that this is its most important postwar enterprise, the research program to which its experts are giving most of their efforts. A demonstration was staged at Indianapolis, the first public revelation of the new system.

RCA considers that teleran is ideally suited to accurate and safe control of traffic into and out of busy airports. Since neither radar nor television can be balked by bad visibility, planes can be moved with regularity when ceilings are low, avoiding the delays of "stacking up" under the control methods now in use.

The radar-television equipment has a range of 30 to 50 miles, which is considered quite enough for airport control. This furnishes the control center and all pilots within range complete data for continuous operations.

The pictures that a pilot sees on his instrument board when teleran is used look more like drawings than photo-



graphs, but they are actually photographed by the television camera at the airport. A composite picture is placed before the camera, consisting of data brought in by radar, weather reports, barometer readings, figures showing the distance from the airport, and so on. Individual messages can be sent, too, for the benefit of any airman in the area. The control officer can do this by pointing to the individual pilot's spot on the picture and inserting instructions or information for him. The television camera photographs the finger against the background of other data.

Voice channels can still be used, but it is anticipated that such communication will be held to a minimum, being usually unnecessary.

Still further simplifying the pilot's task, the teleran apparatus has a method of separating the radar echoes from planes according to altitude layers. This avoids the confusion of showing too much at one time. The pilot can push a button to get a picture of any one of nine altitude layers, with all planes flying in the vicinity for each layer.

By pushing another button, the pilot picks up a weather map whenever he wishes. This is kept up to the minute at the airport control station. The map gives him the weather information he needs much more quickly than if it were sent by voice.

If it is necessary to send a plane to another airport for any reason, the pilot not only gets instruction through the television picture, but his route is drawn on the map for him at the same time. All he does is put his individual light spot on the indicated line and hold it there.

Radar scopes at the airport continually pick up echoes from planes at all altitudes for a distance of 30 to 50 miles. As these are automatically separated according to altitude, there is a separate radar tube for each layer, and a television camera focused on each tube. The map of the area, together with other symbols and information, is drawn on a clear plastic sheet and placed between the radar screen and the camera. This composite picture is what goes over the air waves to the pilot's cockpit. Relative locations of all planes on the map are thus shown to him at all times.

Each plane using teleran carries a "transponder," which consists of a receiver and transmitter connected together so that the transmitter emits one or more pulses when the receiver picks up a pulse from the ground radar. In this way the radar signal passes back and forth from ground to plane constantly.

—*Gold V. Sanders*

Not actual Teleran device, but setup for demonstrating the pickup of a projected radar image by RCA television camera.

model Airliner DeLuxe

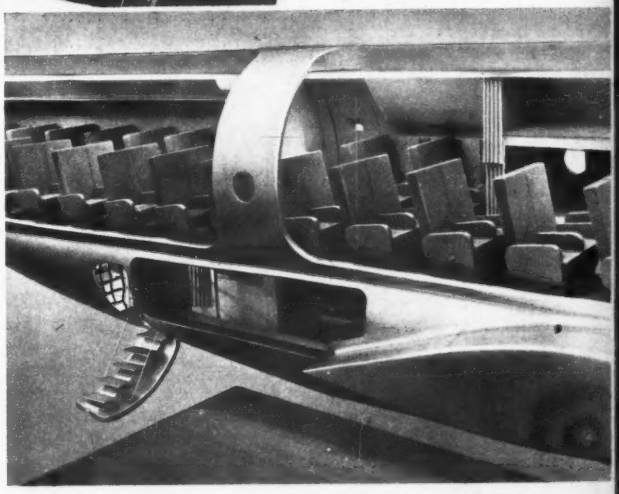
Stewardess Mary Duggan smiles her approval of the one-twelfth scale mockup of the great Stratocruiser.

Left, a women's lounge and semi-private passenger compartment; below, the main cabin and, beneath, another lounge and an entrance.

SOME idea of the luxury and comfort which will be enjoyed soon by air travellers is given in these photos of a highly realistic nine-foot cutaway scale model of the Boeing Stratocruiser.

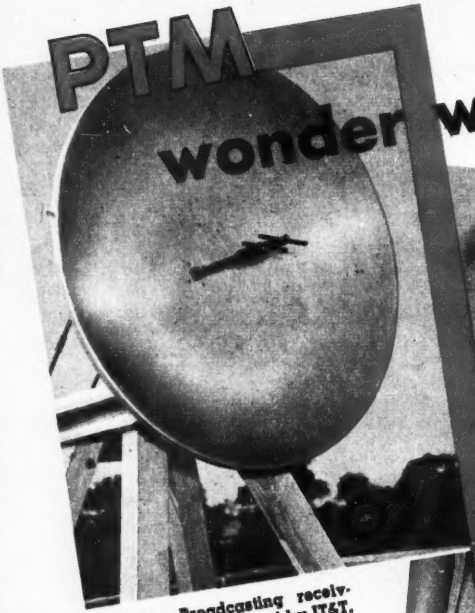
Its upper fuselage deck contains the control room, two passenger sections, rest rooms, and the galley. The lower deck has a luxury lounge and two cargo compartments.

The Stratocruiser is the commercial version of the new Boeing C-97 military transport, holder of a transcontinental record with an average speed of 383 mph. It will carry 80 passengers.

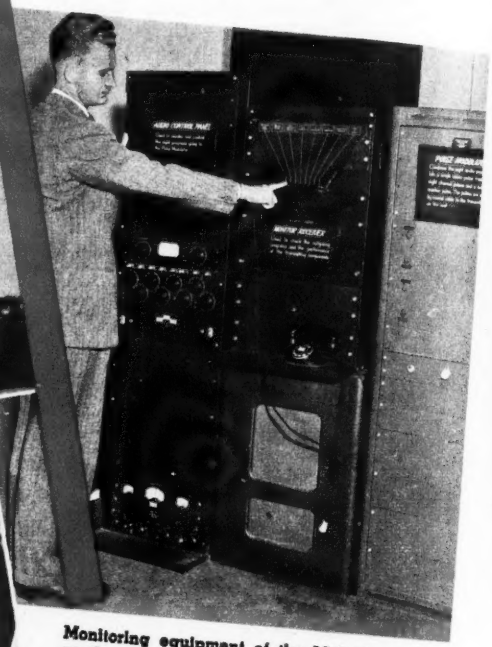


PTM wonder wave of radio

BY GOLD V. SANDERS



Multiplex Broadcasting receiving antenna, developed by IT&T.



Monitoring equipment of the Multiplex Broadcasting transmitter, handling eight programs.

An eight-element square loop transmitter antenna used in the new method.

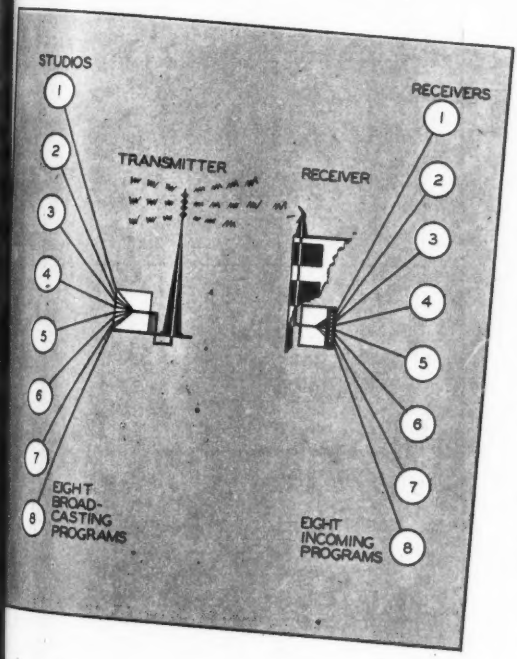
Above, a PTM receiver showing eight buttons for the eight programs.

GET ready for an entirely new kind of radio—PTM, which means pulse time modulation. It is perfected and ready for our use so far as broadcasting and receiving techniques are concerned. But it is so different from the older AM and FM methods (amplitude modulation and frequency modulation) that it will require new receiving sets as well as different equipment for broadcasting.

The most astonishing fact about PTM is that it allows a number of programs to be carried on one wavelength without colliding or interfering with each other. Eight different programs have been broadcast from New York and received in New Jersey in a demonstration by engineers of Federal Telecommuni-

PTM makes possible the broadcasting of eight programs on one wave—with high fidelity and no static.

Tiny pieces of eight programs are transmitted on one wavelength and reassembled by the receiver.



cation Laboratories, the research organization of International Telephone and Telegraph Corporation. It was an achievement that amazed the group invited to witness it.

The engineers say that even more than eight separate programs can be bunched. They will not predict just how many.

Of course this spells greater enjoyment for the radio listener when the new system goes into general use—as it is bound to because of its advantages over AM and FM. It will mean a wider choice of programs at any one time. The hours of the day when almost everybody wants to hear the radio will not necessarily be monopolized by programs that we may not want to hear.

Since PTM broadcasting can multiply the capacity of each wavelength by eight or more, it should no longer be necessary to listen to soap opera or nothing. One channel might carry sports continuously, another classical music now crowded off the air because of the larger demand for more popular kinds of entertainment. There might be one channel dedicated to educational matter, one to records of dance music, one to opera, and so on. Minority groups will get a better deal.

The eight programs we're talking about, bear in mind, are all carried on one wavelength. You don't tune in your receiving set in the usual sense; you press one of eight buttons. The PTM receiver is "fixed-tuned." Of course, another whole set of different programs can be broadcast on a neighboring frequency from another transmitter, and to receive these you will merely tune your set to its wavelength and use your eight buttons as before.

Broadcasting companies have as much reason to be excited about this as the listening public. Economies of attractive dimensions are promised them, since they could put out eight or more programs with one transmitter, and that one operating on a very low power output.

Still another rich dividend is promised by the PTM multiplex system. You can connect one PTM receiver in your house to any number of "satellite" receivers placed in different rooms, and each of these will give you any of the programs at will. These satellites will consist merely of a small amplifier, a speaker, and a set of selector buttons. This setup is a natural for hotels, apartments, and the companies that pipe music to restaurants. It is expected that PTM will see one of its first large scale uses in such commercial channels as this.

How is it possible to transmit a number of separate programs on one wavelength? To answer this let's see if we can get a general idea of how PTM works, how it differs from amplitude modulation and frequency modulation.

Pulse time modulation involves broadcasting a series of extremely short bursts or pulses—and that is where it gets its name. The bursts are half a millionth of a second in duration. There are blank spaces

between them, but the ear can't detect these blanks because they occur too rapidly—just as the human eye is incapable of seeing the blanks that occur between pictures on the movie screen. PTM's carrier wave, therefore, sounds continuous.

The PTM signal, or message, whatever you want to call it, is transmitted with a variation of the duration of the spaces betwen the pulses, whereas the AM signal is produced by a variation of amplitude and the FM signal by variation of frequency. Amplitude and frequency do not carry the signal, or intelligence, as engineers call it, with PTM transmission.

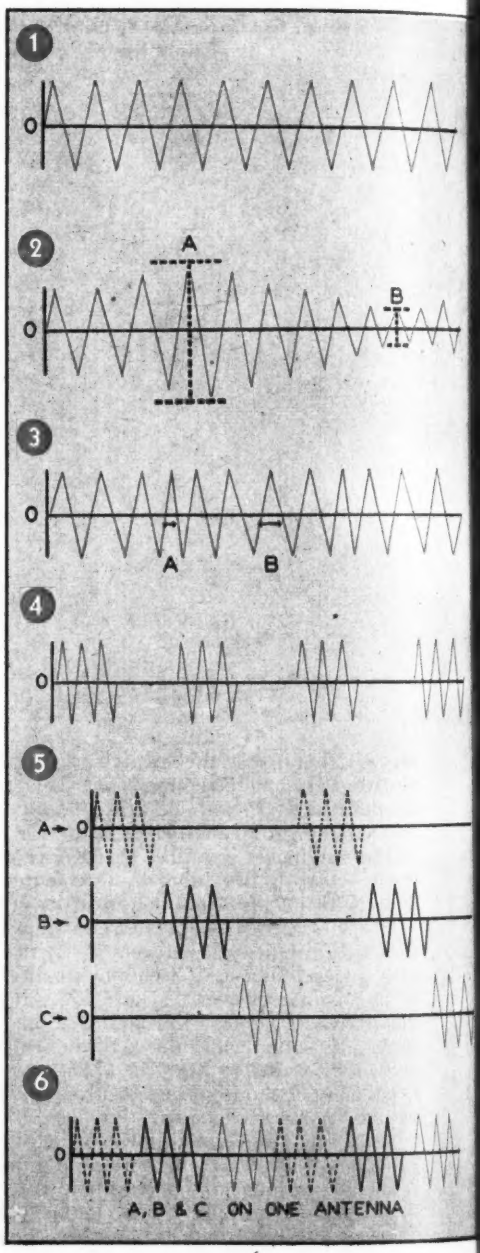
The PTM transmitter used by I T & T sends out several hundred thousand successive pulses and lapses in one second. A signal of high fidelity carrying one program is put on the air at the rate of 24,000 pulses per second. For eight programs there are 192,000 pulses.

Various programs are picked up by wire from different studios, or different buildings, and all go into the transmitter at once. The PTM transmitter may be said to divide its time between them, taking in turn a bit of one, then of another, and so on. Each program is "sampled" 24,000 times a second, and each sample constitutes an infinitesimal fraction of a sound wave. Put all these fractions together in proper order and you have whole sound waves—music, voice, ticker, facsimile, teletype or any other type of intelligence that can be transmitted by radio wave.

All eight programs are fed to the transmitter at once, but they are not scrambled or mixed up. Each bit of each program is in its right sequence. They travel through the air in this way, as one wave. A directional antenna on the PTM receiver picks up this wave and the receiver separates the programs nicely into their component parts and puts each one back together in proper order before sending it through the speaker.

PTM must use ultra-short waves and can be transmitted only to the horizon from the original transmitter, like television. But it can also be picked up at relay stations and rebroadcast in the same form to cover more territory. The antenna of the PTM receiving set is permanently pointed toward [*Continued on page* 165]

1, basic radio carrier wave. 2, AM: frequency is constant and amplitude varied. 3, FM: amplitude is constant and frequency varied. 4, PTM pulses of a one-program broadcast. 5, pulses of three PTM programs transmitted separately and, 6, transmitted at the same time on one antenna.



PINWHEEL BUS

Time-killing bus rides from airports to cities will soon be quick hops in ten-place 'copters.

FROM the window of the airliner, you look down upon the city of your destination. The plane turns with deceptive laziness—you're moving at a rate of almost 200 miles per hour—and approaches the field. Minutes later you step to the ground. Ah, the wonders of flying. The two cities are 200 miles apart. You've gone from one to the other in a little over an hour.

But have you? Let's see what happens next.

You climb into a "sedan" with ten other "air travelers" and start out for the city in which, according to the timetables, you have already arrived. You wait for the stop signs. You slow down to 20 behind that truck until the road clears. Traffic thickens in the suburbs. Maximum speed limit, 30. You wind through the freight yards. You angle through the factory district. With luck, you twist through a green park. More stop signs. But at last you've really arrived, one hour after your official arrival.

That last 20 miles cut down your average speed a bit, didn't it? Getting into town took as long as your 200 miles of air travel. If only that "sedan" (airline language for "bus") could grow wings.

Well, its counterpart *is* growing wings. All of the above is the picture of air-travel today. You'll see a picture of tomorrow—an early one—as you turn this

The six-bladed, twin-engine XR-8 was the guinea pig for the new air-bus.

You won't worry about traffic or stop lights when the KH-2—in mock-up form below—heads into town at 118 miles per.

INTERMESHING
EGG-BEATER
TYPE ROTORS
FAIRED-IN
ROTOR HEAD
ALL-
PORT
FUSE
GEAR CONVERSION
BOX FOR ROTOR
SHAFT DRIVE
BAGGAGE OR MAIL COMPARTMENT
(33 CUBIC FEET CAPACITY)

page. The "pinwheel" bus is taking form in Kellett Aircraft's plant in North Wales, Pennsylvania. It's a helicopter, of course, and it's called the KH-2. It will carry ten passengers, too, just as the sedans do. But there similarity ceases. Instead of crawling along through traffic, you'll go over the building tops at a speed of 118 miles per hour. You'll land on a city roof, possibly your own hotel, and slip down to the street in an elevator. That last 20 miles of post-arrival travel will become 15 minutes of fun instead of a boresome hour.

The KH-2, which Kellett says will be ready for use in about eight months, will carry a total useful load of 2,942 lbs., and will have a gross weight of about 11,600 lbs. Range will be 180 miles.—*C. B. Colby.*

CANDID PICKUPS

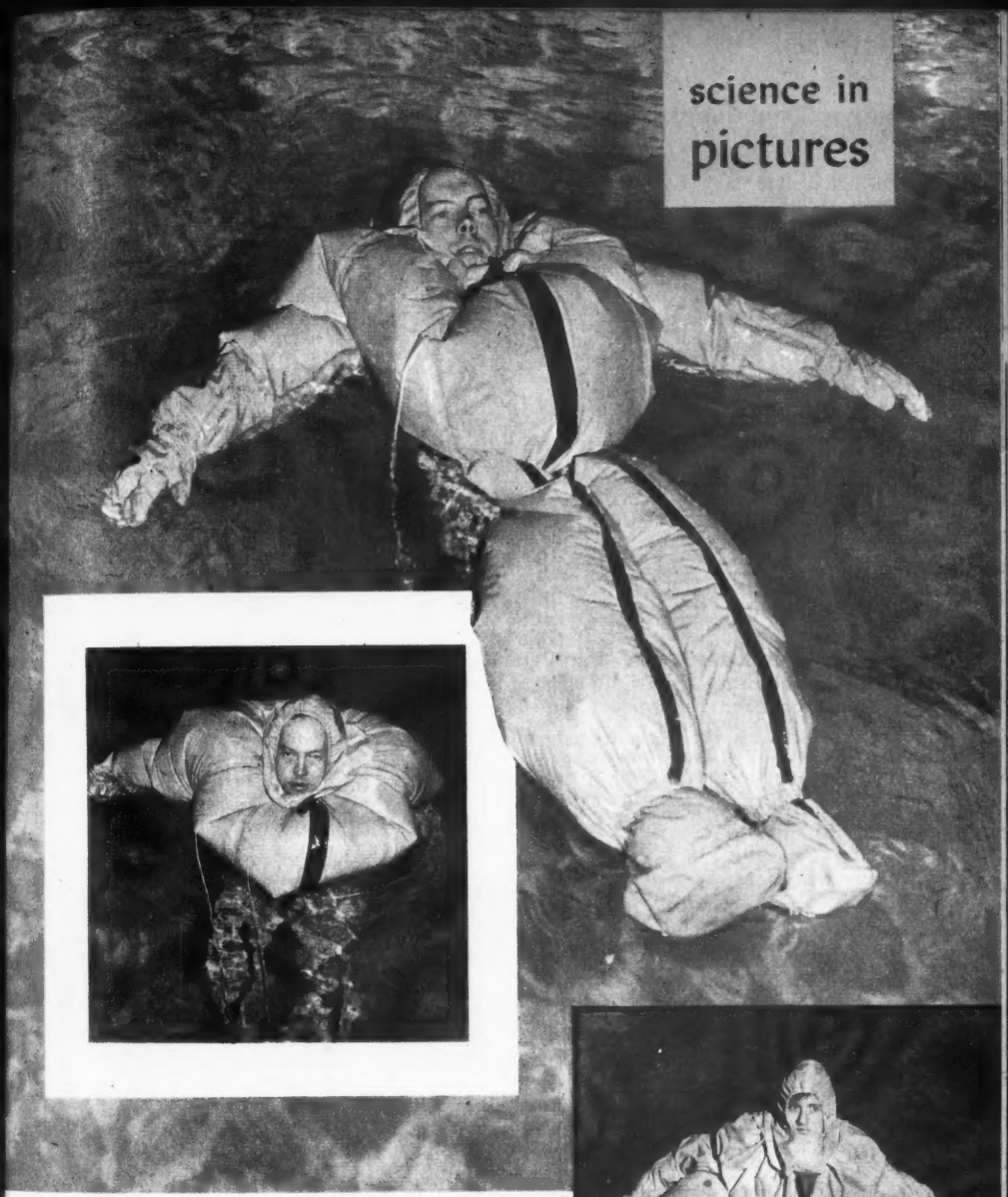
IF YOU don't think amateur recording is fun, just ask Johnny Olsen, radio papa of "Ladies, Be Seated." He's [illegible] recorder for years. You don't have to stay home with them, either.

Olsen rigged up an adapter and plugged his into his car battery through the cigarette lighter cord. Among the oddities he's captured in sound are the hiss and swish of Old Faithful geyser, the sniff of a Yellowstone bear (it refused to growl) and an interview with the engineer on a locomotive traveling 120 mph.

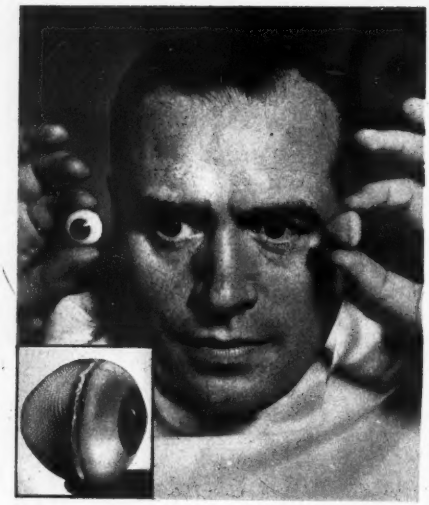
Anyone can do it, says Olsen. It just takes a few gadgets, a little ingenuity—and a sense of humor.

Olsen ventures everywhere to record the unusual. Above, he interviews a pair of lovers just as they enter the "tunnel of bliss."

His whole outfit cost only $75. It's got a two-speed motor, a hand mike and an adapter so he can hook it up to his car battery.

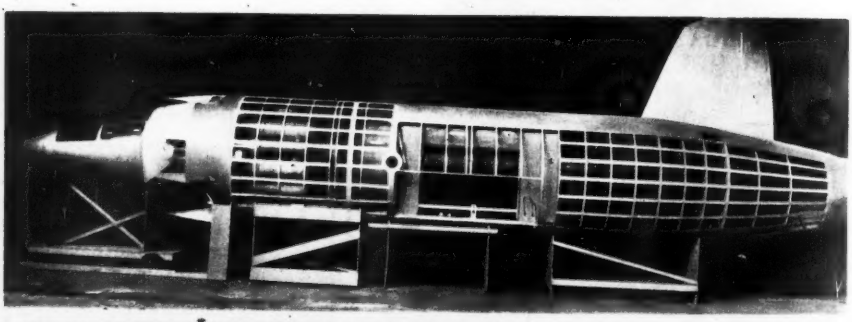


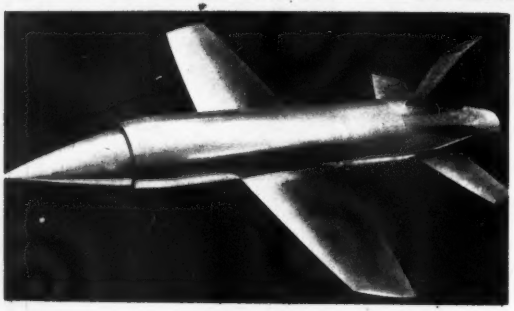
Bailout Suit is another forward step in the Army Air Forces' ceaseless efforts to save lives in airplane emergencies. Neither biting Arctic blasts nor tropical suns can damage this new rescue device, developed and tested thoroughly by the Air Transport Command. It can be donned in less than 40 seconds and covers the entire body, leaving only the face exposed. You can lie down (as shown at top), stand up in the water (above), or—with another attachment—you can sit up in a self-inflating raft.



Mobile Plastic Eye that moves in co-ordination with the wearer's good eye is held at left by Fritz Jordan who developed it in association with Dr. A. D. Ruedemann, chief eye surgeon of the Cleveland Clinic. Mobility is obtained by sewing the eye muscles to a mesh of tantalum metal covering the back of the plastic eye.

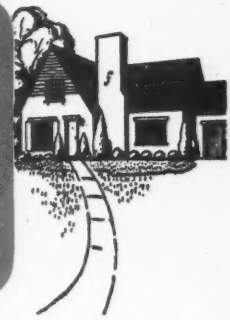
World's Largest transparent plastic bubble, shown at right, measures 11 feet in diameter and four and one-half feet deep. It was formed in a huge vacuum tank, required four months of engineering effort and cost a total of $10,000. What will it be used for? To cover an advertising sign. Ah, Science.





Bullet Man may well be the sobriquet of the pilot of this 1,000-mph projectile, shown in mock-up form above, and as a model at left. The British M-52 jet is 33 feet long and has a wing span of 27 feet. It has a detachable cabin which would enable the pilot to bale out at supersonic speed in the stratosphere.

Have you considered a career in PLASTICS?



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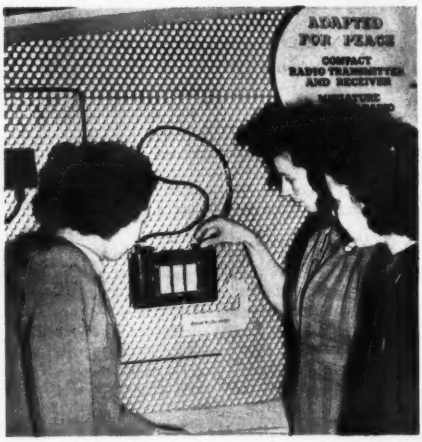
Jet Rotor Tips supply power for the Doblhoff helicopter, made in Austria for the Germans. A supercharger blower actuates compressed air mixed with gasoline which is vaporized and ducted through the hub and hollow blades to the rotor tips. (See "Jet Props for Lightplanes," MI, Nov. '46).

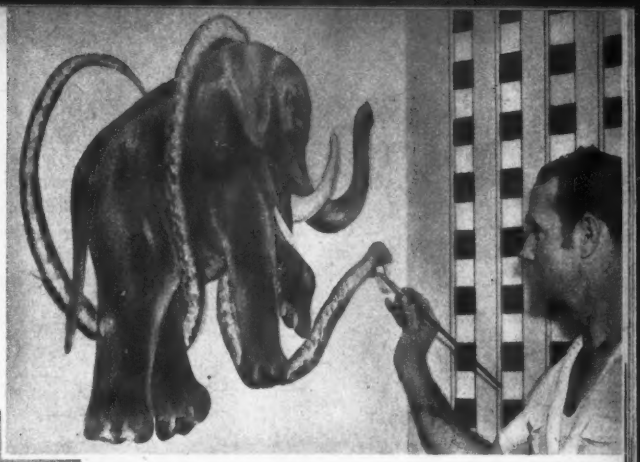


Midget Radio, left, is tuned in by an official guide at the Victoria and Albert Museum in London where it was one of 6,000 items in the "Britain Can Make It" Exhibition. It costs about $70.

Unsinkable, uncapsizable and self-emptying is the inventor's claim for the model lifeboat at right. It is actually two boats fashioned bottom-to-bottom. The design calls for a diesel engine which will work either upright or upside down. Non-return valves empty boat of water.

Toe Preview will eliminate guesswork when salesmen fit kiddies' shoes with master sizes made with transparent vamps of Vinylite. Developed by Step Masters, they're supplied to dealers in full sets of half sizes. Vinylite is Bakelite's name for transparent vinyl plastic.

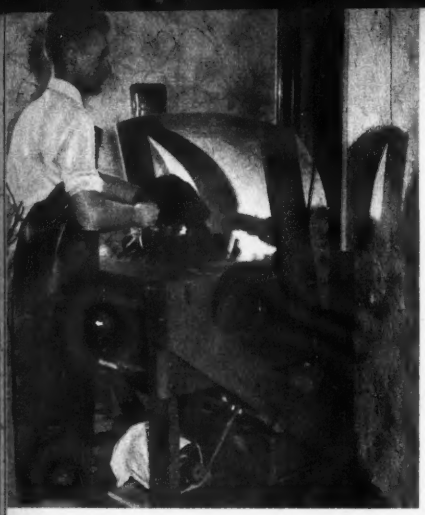
Never Again, swear drunks who wake up in the Galena, Ill., jailhouse. For there in front of their eyes is the gosh-awful biggest snake they ever saw. And wrapped around a pink elephant, too. Jailer George Herman says the scheme may not be scientific, but it works. He's thinking of adding an octopus.



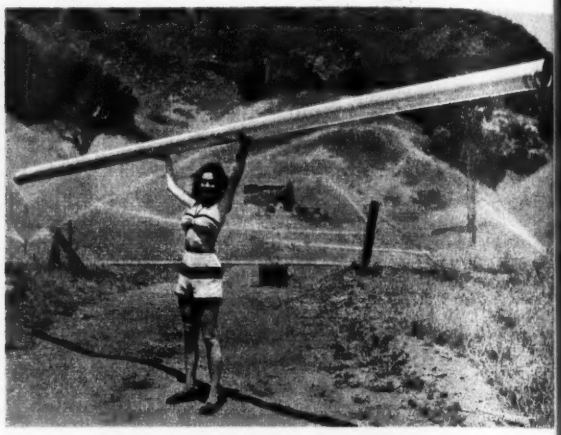
Braille Typewriter for the blind has been developed by Dr. Alfred Banks who, formerly blind, once had to struggle through the Braille slate writing system. The writing comes out in raised dots on a "ticker tape" which the blind read by running it through their fingers.

Robot Ticket Clerk does everything but dust you off with a whisk broom and put you on the train. At Pennsy's suburban station in Philadelphia, all you do to buy a ticket is press the button next to your station, and drop in a coin. Out come ticket and change.

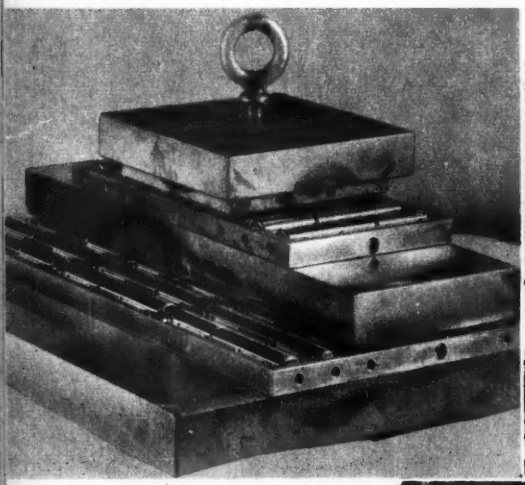
Knee-High wash basins with mirrors to match were the delight of youngsters visiting the recent "Britain Can Make It" Exhibition in London. There's also a miniature bath and toilet room. That child looks a little stiff, doesn't she? Right, it's a plaster model.

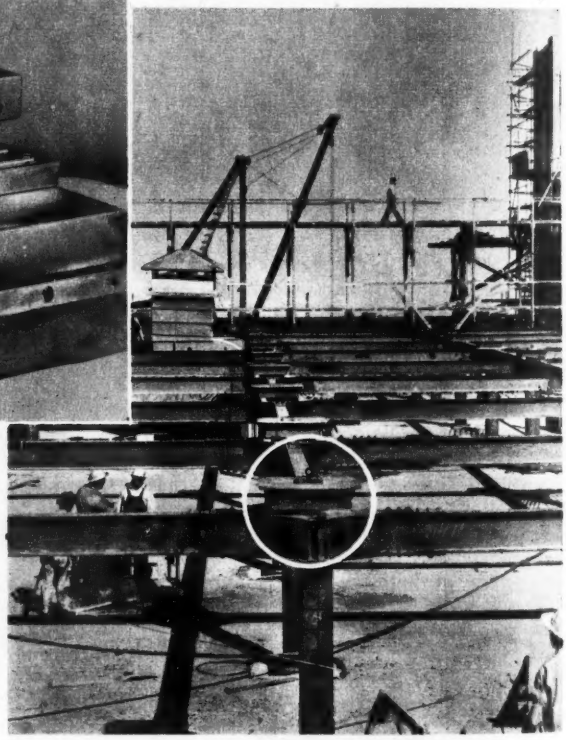


Feather Plucker is demonstrated at left by its maker, Irving Sutter of Delmar, N. Y. On the revolving cylinder are rubber paddles which—Irving says—"spank" the fowl (yes, it's dead) and adhere to feathers, plucking them out.

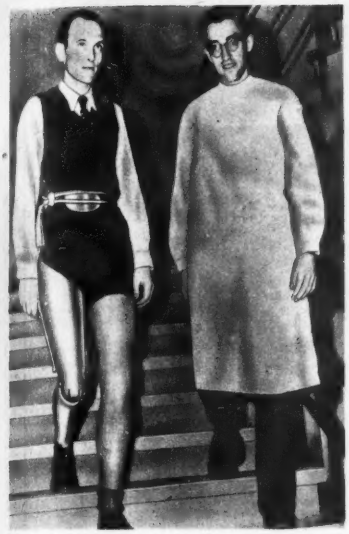


Lady Sampson? No, the water pipe is aluminum and weighs only 30 lbs. Nice costume for January, eh? Good old California.

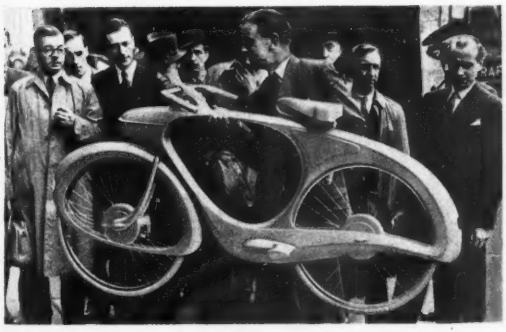




Quake-Proof bearings, at right and above, will permit a three-story addition atop a six-story Los Angeles building to "roll with the punch" six inches in any direction. Each bearing will support 250,000 lbs., and consists of three steel plates with two interposed sets of rollers.

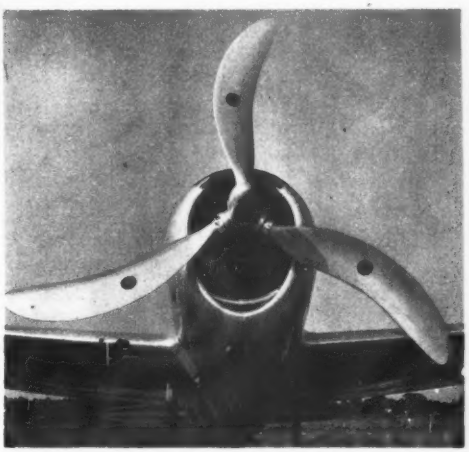


Hydraulic Leg designed to give amputees the knee action essential in climbing stairs efficiently was developed by the Germans. The picture with schematic drawing at left was found among enemy documents and studied closely by the U. S. Air Material Command. (Compare with drawings in "Limbs To Order," MI, Nov. '46.)



Courage and ingenuity were responsible for the strange vehicle above. When this man was almost completely paralyzed after an injury, he vowed he would get around like other persons. He kept his word, and now drives through the heaviest traffic in his five-geared 6-mph car which he built with the help of a youth club of which he is president. He is Sidney Jones, of Stoke-On-Trent, England.

"Electric Bike" above boasts a dynamo which stores energy while traveling downhill and releases it to provide power for climbing up grades. It was another of the 6,000 products exhibited at the "Britain Can Make It" show and was designed by B. G. Bowden.



700-MPH Propeller at right was developed for the Army Air Forces by Curtiss-Wright. The swept-back blades cause less turbulence and air loss at high speeds than conventional type propellers. Designers claim that this prop will compete favorably with turbo-jets.

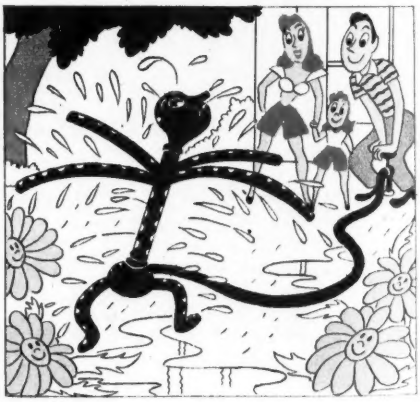
MI LOOKS AHEAD

WITH LOUIS WOLFE

Up Periscope! What's that jam up ahead? Soon—if you care to make a small investment in fun and practicality—you won't have to guess. A small auto periscope, which you can raise and lower at will, has been developed by Bryon L. Brinkley, of Rodessa, Louisiana.

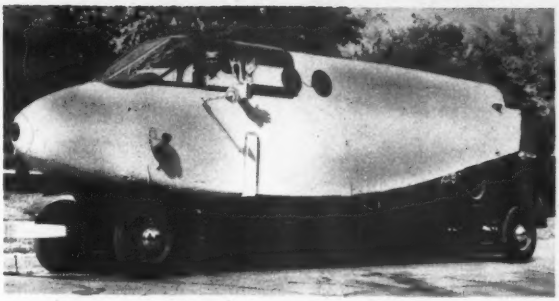
Illuminated Handbag will enable madame to find her keys, lipstick, change and the thousand and one other items that get lost in this well-known catch-all. A moveable flashlight that lights up only when milady's purse is open is the brainchild of Robert A. Moss of Cheyenne, Wyoming.

Sorry, The Job Is Filled A perfect fit in ladies' hose may result from the new mechanical device below, that measures legs for length, circumference and knee-action. Wrinkles and poor fits causing runs can be eliminated. And it's no gag—Holeproof Hosiery makes it.



Walking Sprinkler will water every nook and cranny of your lawn all by itself. Driven by water power and geared to travel over the lawn in a straight line or circle 60 feet in diameter, it can move at a speed of 30 feet per hour and even climb 15 degree slopes.

Airplane House at right solved the dwelling shortage for E .H. Kantz of Dallas, Tex. He built it from an old A-10 fuselage, an ancient Cadillac chassis—which he extended 10 feet—and a Ford V-8 engine. It won't fly, but you get the sensation of landing an airplane when you buzz along at 50, he says.

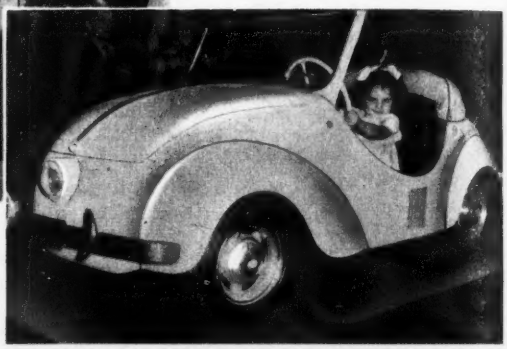


Bubble-Eyed Horse on your right was snapped down in Mexico City, but he positively did not get that way from eating peppery hot-tamales, his owner informs us. The plastic goggles are for protection from mud and are worn by "Royal Hustle."

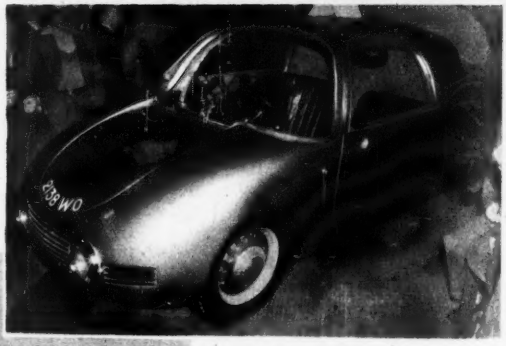
Rocket-Cycle is explained by Professor A. M. Low of London while Alec Jackson gets ready to take-off—along the surface, he hopes. Low has been experimenting with rockets since 1917. Four of his rocket-assisted motorcycles were demonstrated at the Wembley speedway meet.

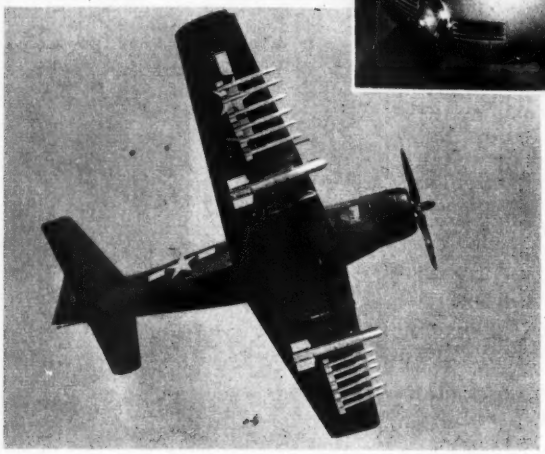
Knee-Action Tractor at right lifts its rear "feet" when stumps or stones get in the way. The vehicle is the invention of L. C. Burton of Akron who worked on it five years in his back-yard workshop. The automatically adjusting wheels keep the tractor on the level.

Butyl 'n Beauty on display at left herald a new style automobile inner tube designed to prevent the rapid deflation of air in the event of a puncture. Waffle-like construction causes a squeezing action around nail holes. Butyl is a synthetic rubber which retains air better than the natural product. The beauty—not synthetic—is Rae Caldwell.



Paris Motor Show in the French capital's Grand Palais featured this white, two-seater midget—with its petite driver—and the unusual model car at right designed and built by Jean-Pierre Wimille, European road racing ace. The driver's seat is in the center, as is the American "Torpedo" designed by Preston Tucker (see "Torpedo," MI, Nov. '46). This position for the driver improves his visibility and judgment necessary for new high speeds.





Tiny Tims, all 6,000 pounds of them, cling to the wings of the Navy's carrier-based AD-1 Skyraider, now in production at Douglas' El Segundo, Calif., plant. The battery of Tiny Tims, two 12-inch and twelve 5-inch rockets, pack the explosive punch of a light cruiser surface ship. The AD-1 can carry a bigger load farther than any other plane of its type.

in league with the devil

Is Satan a tempter and cheat, or only an innocent scapegoat for man's own folly? Ask Count Walewski—he deals in devils.

THE sign on the door says, "Esoterica." On nice days a hideous little bronze devil holds the door open and leers at all who pass through its portals.

Inside the tiny store in mid-town New York the visitor finds himself glared at from all directions by every type and nationality of devil. He is almost surprised when, from the midst of all this conglomeration of purgatory, a friendly gentleman rises to greet him—for Count S. Colonna Walewski, dealer in devils, witch-craft and sorcery, and owner of "Esoterica," is really a nice guy in spite of the company he keeps.

Twenty years ago Count Walewski, then a student of psychology, became personally interested in the devil when his studies led hi to the theory that down through the ages, Satan has really been nothing but an innocent scapegoat for man's sins.

Today his collection of devils, devil masks, and devil paintings represents a major portion of his vast collection of antiques which run the gamut of time from the stone age to the present. Count Walewski, himself, is an authority on all forms of Satanic worship as well as the history and practice of witch-craft and sorcery.

With a devilish gleam in his eyes, he relates the story of a prim old lady who came into his store one day to look at some antiques. As she browsed around she became more and more infuriated at the devils that glared at her from all corners of the room.

Suddenly, she turned on Walewski and shrieked: "This is a den of iniquity—and *you* are the devil!" With that she huffed out of the store, tripped over the devil in the doorway and sprawled out onto the sidewalk.

Descendant of one of the oldest Polish families, Lithuanian-born Count Walewski early in life developed a deep interest in the past. As a young boy in Poland, he spent many of his days digging around in old ruins, family attics and cellars. Wherever there was an old cellar or attic loaded with trash and crawling with mice, young Walewski was there, too, rummaging around for relics.

It was during one of these hunting sessions that Walewski, only 13 at the time, had his first run-in with the devil. He was rummaging around in a family attic when he came across an old Polish manuscript, written on parchment, telling

You'll find the devil in all his forms and faces in the count's bizarre shop.

"how to invoke the devil, Tavriel, and make him do your bidding."

"Get some holy water for exorcism," said the parchment, "some chalk for a holy circle, a sword with magical inscriptions, a white linen robe, some candles and incense."

At the hour before sunset the reader was advised to make his magical circle and, with the aid of all his paraphernalia and certain incantations, invoke the devil to appear—then exorcise him to do his bidding.

"However," went on the instructions, "you should invoke the devil to appear in a pleasant form—not in a terrifying one that would frighten you. He may appear in any form, a dog, a friend, a relative—he may even appear in the form of your mother. Therefore, do not be fooled by him, and do not leave the circle. Show him no fear and exorcise him the harder to do your bidding."

Fascinated, young Walewski gathered together the necessary paraphernalia and at the prescribed hour, went to the attic, drew his magic circle and started the ritual. Before he was even through, he heard footsteps approaching and his aunt stepped into the room.

"What's going on here?" she inquired. Walewski became excited. Things were working ahead of schedule.

"You are the devil, Tavriel," he shouted. "You must do my bidding!"

Harder and harder he exorcised the bewildered lady when suddenly she stepped right through his magic circle and saw the ancient parchment.

"Heavens!" she screamed, and seizing a pair of tongs she snatched up the manuscript and burned it in the fireplace. Walewski was immediately taken to church and had his mouth washed with holy water. It took many weeks of confession and prayer to cleanse him of his rendezvous with the "devil." To this day, however, he still grieves over the loss of that ancient parchment.

Superstitious collectors of good luck charms are steady customers of the count, the majority of them having their own particular preferences. Cats are one thing Walewski can't get enough of. He has even sold some Egyptian mummified cats.

"The Egyptian cat," says Walewski, "is a symbol of grace and independence. I have many women customers who collect them."

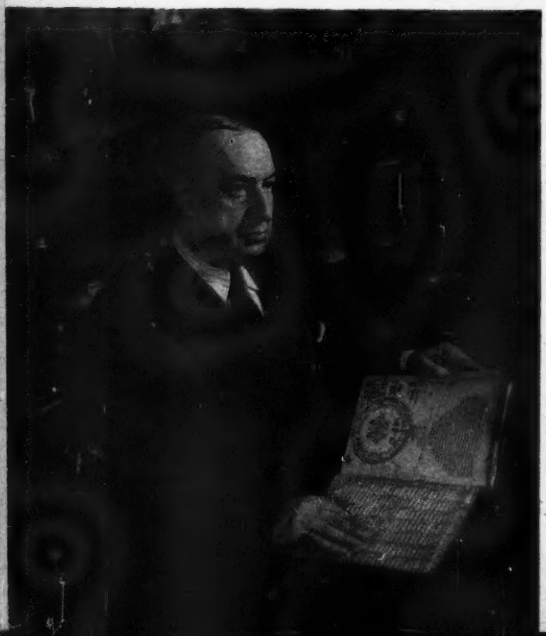
Walewski, himself, reluctantly confesses to a few superstitions of his own. For good luck, he always carries a couple of ancient trinkets in his pocket, one a 2500-year-old, corroded little bronze fig-

Persians still use the devil's head at left to invoke thunder and rain. Below is a Japanese version of Satan.

Japanese Oni's or devil masks vary in expressions from the grotesque countenance above to the grinning head on next page.

Terrible indeed is Hayagriva, Tibetan demon, right. He wears a necklace of human heads and crushes babies under his feet.

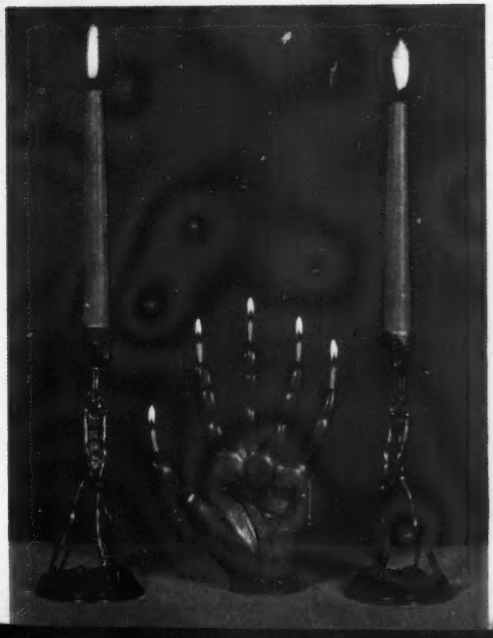
The devil, says Count Walewski, shown below, is the symbol of human weakness and the eternal alibi for all those who do evil.



ure and the other an old Spanish coin, one of the first made in America. His pet good luck charm, though, is a 500 B, C. Greek ring with an amethyst containing a bull intaglio. He has refused to sell this ring even when offered ten times its value.

"Every belief has a psychological or physiological reason," he claims. "Take the superstition about walking under a ladder, for instance. That has a physiological basis. It stems from the fear of injury that might be incurred from some object falling from the ladder on the person walking under it. On the other hand, my little trinkets in my pocket make me feel good. I wouldn't feel good without them. That's the psychological part."—*Louis Hochman*

Photos by Koepper, Globe.



Lhamo, Tibetan Goddess of War, above, is nine feet high. The facsimilie of a dead human hand, below, was used by robbers to cast a spell over victims.

Bow and Arrow for Boar

Not since the Cherokee Indian was driven from the Chattahoochee Valley a century ago has man indulged in this dangerous game.

THE odds are against the hunter. Not only does he lack the killing power of a rifle, but he must creep much closer. To miss is dangerous.

But wild boars can be killed with long bows and broadhead arrows, as archers proved in this five-day bow and arrow big game hunt in the Chattahoochee National Forest of North Georgia.

Thirty-two nationally known archers from nine states pitted their skill against the wary wild hogs and deer that roam that mountain fastness of the Blue Ridge. Two of these hunters became the first to bag wild boar with bow and arrow since the Cherokee Indians were driven from this same area over a century ago.

Hugh Thompson made the first kill. After 90 minutes' stalking, he fired the arrow that pierced a 172-lb. boar's tough hide in a fatal spot.

The second and more exciting kill entailed near tragedy for the hunter. When Charles Langley, Jr.'s first arrow only wounded a 147-lb. wild hog, the animal charged. Langley narrowly escaped in the branches of a tree where he loosed the second and killing arrow.

Success of the hunt, sponsored by the Georgia Division of Wildlife and the United States Forest Service, has inspired state game officials throughout the nation to consider opening special seasons for archers.

This was the second attempt by archers to bag wild boar in the Winding Stair Gap section of the Chattahoochee, the first year's hunt having produced no kills of either boar or deer.

Archer Langley, left, took to a tree when his first arrow only wounded this 147-lb. wild hog.

Bruce Spencer misses a deer and pays the customary penalty—his wife cuts off his shirt-tail.

Broadhead arrows have a razor's sharpness as this wise-cracking newspaperman learns below when indignant archers give him a huntsman's shave. At right, Phil Cozad of Columbus, Ohio, helps his wife sight her hunting bow.

Watchful and ever ready are the volunteer "St. Bernards" of the ski trails.

Photos by J. J. Fanta

Ski Patrol

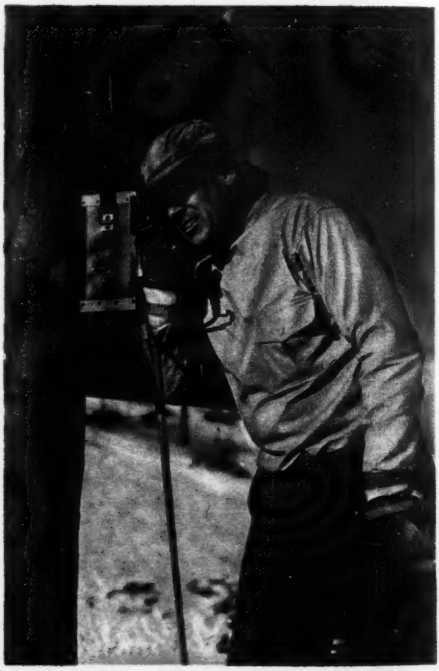
BY EDWARD KELLY

IT IS a point of danger.

Regularly at 20-second intervals, up out of the mist shrouding the snow-blanketed mountainside, the gently-swaying chairs of the cable-lift reach the platform atop lofty Mt. Mansfield. As they approach it the skiers set their dangling skis together in a straight line, preparing to shift their weight to them and slide off, while the chair, never stopping, circles narrowly and starts back down to the loading platform, 2000 feet below.

One skier, an inexperienced girl, neglects to get her skis under control, and as she stands and starts to slide off the platform they cross, and she falls. She cries out with pain. She tries to stand and cannot. Her ankle has been badly injured.

Fortunately for her, help is close at hand. Several members of the Ski Patrol, all expert skiers trained in first aid, are in attendance near the chair-lift platform. Within a few minutes



Telephone at top and bottom of ski trails allow quick calling for aid and supplies.

Patrolman finds girl with sprained or broken ankle, and takes off her skis.

they have removed her skis and carried her to the Octagon House, a small lodge nearby, where they carefully remove the boot from the hurt foot and apply a box splint for protection. A phone call to the loading platform at the foot of the mountain stops the chair-lift. They carefully strap the girl in a chair and send her down. And as she lowers they themselves streak down one of the fast trails, meet her on her arrival, and carry her to a taxi which will take her to the nearest hospital, 15 miles away.

The great care they took to protect the injured foot is justified. X-ray examination shows that the girl has suffered a compound fracture of the ankle.

Accidents like this, not uncommon in such a hazardous sport, have increased with the expanding popularity of skiing. Recognizing the need of providing assistance to the injured, the National Ski Association in 1939 started the National Ski Patrol. Its members, all volunteers

He summons other ski patrolmen and they skillfully apply a traction leg splint.

Safe and comfortable, the ski casualty lies ready for her long-sled ride back.

The actual rescue of an injured skier. Ten men haul a ski veteran up Vermont's Mt. Mansfield on a toboggan after he fractured his leg on the Nose-dive Trail.

and unpaid, must be expert skiers and have 20 hours of training in first aid. At every skiing center in the nation, local branches of the Patrol are ready to go to the help of skiers who need help.

An ambulance sled is standard equipment. Even the expert sometimes suffers mishaps on such fast and tricky trails as the Nose-dive at Mt. Mansfield, a dizzying 1800-foot drop down the precipitous side of the mountain. When a skier comes to grief on that trail, the Ski Patrol sets out with its sled and emergency splints to the scene of the accident. If the skier has injured an arm or leg, the Patrollers place it in a box splint, wrap the sufferer in warm blankets to guard against exposure while his resistance is lowered by shock, and secure him firmly on the sled.

If an accident occurs nearer the top of a trail than the bottom, the Patrollers haul the sled back up the steep mountainside and take the injured person down in the chair-lift; otherwise they usually continue on down the trail with their charge. It is a question which way is more difficult.

Rescuing of the injured is the most spectacular part of the Patrol's self-imposed task, but it is not the main part. Most of their time is spent patrolling the many miles of ski trails, keeping a keen watch for fallen branches and obstructions that can cause serious accidents. Most common of all the trouble spots is the sitzmark, a hole in the snow caused by a skier's fall. Even a light person falling while traveling at high speed, can make a dangerous depression in a trail. Despite signs on every trail warning skiers to fill in their sitzmarks, the Patrol still finds many.

The Patrol also checks the trails for snow conditions. A sudden thaw makes trails sluggish and dangerous; they test them and post warnings. A heavy snowfall or overnight freeze may make them impassable; they make a report.

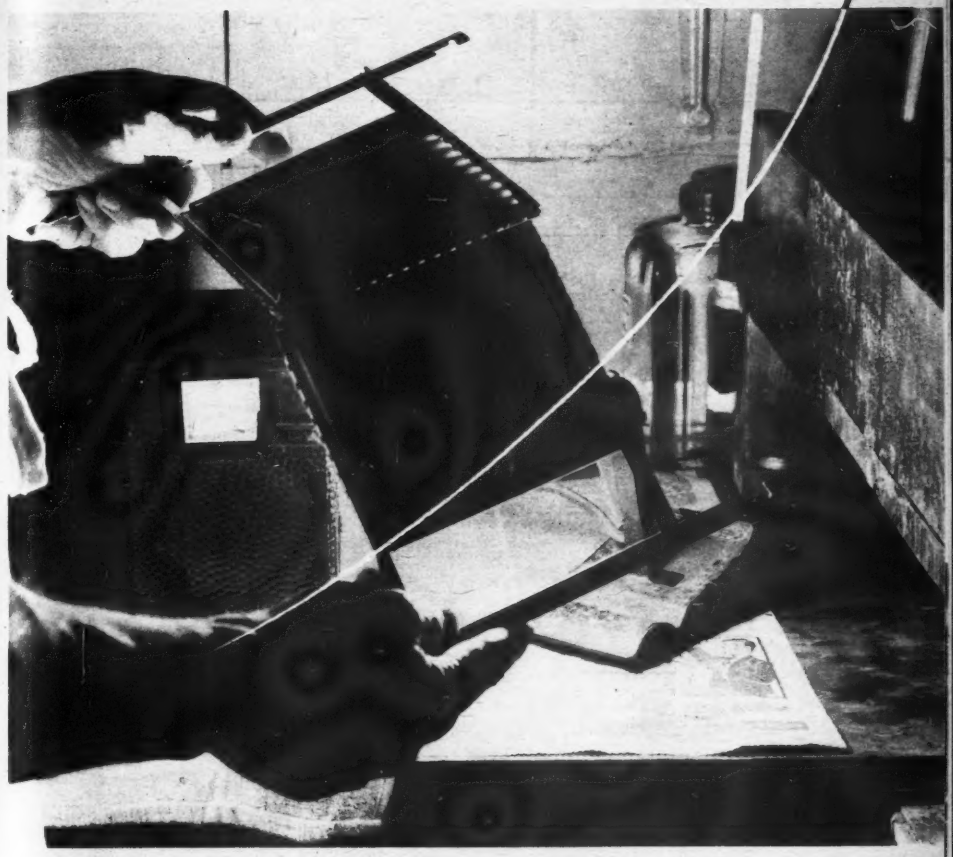
Always there is the job of replenishing supplies at the first aid stations placed at intervals along the trails.

Volunteers as they are, the Patrollers maintain a high standard of efficiency and devotion to duty. Because of the record they have established as the "St. Bernards" of the ski trails, they have deservedly won the deep respect and admiration of all skiers, "dubs" as well as experts.

NEW COLOR FILM

develop it in your darkroom

MI's Photo Editor rolls up his sleeves, wipes his brow and gives you the low-down on developing Eastman's new film, Ektachrome



BY ROBERT BRIGHTMAN

CAN you develop a roll of film in the dark? If you can then you should have no trouble developing Eastman's new color film, Ektachrome. In fact, in many respects it's even easier, for during the second step you can turn on the lights for the balance of the operation.

Ektachrome sells for about half the price of Kodachrome. This is offset to a certain extent by the time required to

Multi-flash shot on Ektachrome, Type B. Note how all the shadows retain their original color.

A fifteen-second exposure at stop f-22 took the interior, below, with three No. 2 Photofloods.

do your own processing and the cost of the five solutions required.

One terrifying aspect of Ektachrome is the appearance of the film after the final rinse. The Eastman Kodak Company says in its instructions, "until the film is dry it appears opalescent." Actually, the film appears greenish-blue on one side and yellow-brown on the other. The colors, by transmitted light, appear muddy and degraded by a brownish cast. If the transparency appears dense during drying it is usually a sign of correct exposure. *The true colors are not apparent until the film is completely dry.*

I found that the best results were obtained when the film was exposed at Weston 4 for the Type B emulsion rather than the 8 recommended by Eastman.

Here is the developing procedure:

1. Put the film in the first developer and agitate. At the end of 15 minutes, drain and rinse.

2. The film is then hardened for 9 minutes. During this step, the

Photo by Norman C. Lipton

Type B film flashed with two No. 5 midgets. "flash" filter, f-14; the main light was at 4 ft.

lights can be turned on. The film, at this point, looks like a partly fixed black and white negative.

3. Remove the film from the hardening bath and expose each side to a Photoflood lamp. Rinse for 5 minutes in running water. The film looks milky at this step.

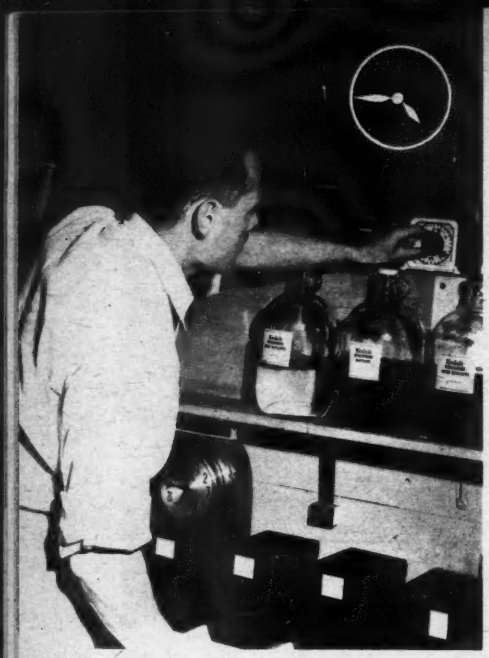
4. Now we come to the actual color developing. The film is placed in the color developer, agitated and kept there for 25 minutes. The film will turn blue on one side and yellow-brown on the other at the end of about 4 minutes.

5. The film is then immersed in the clearing and fixing bath. There is no great change in the film at this time. The brown in it is partly visible on the blue side as a sort of darkish red. After 5 minutes, remove and rinse.

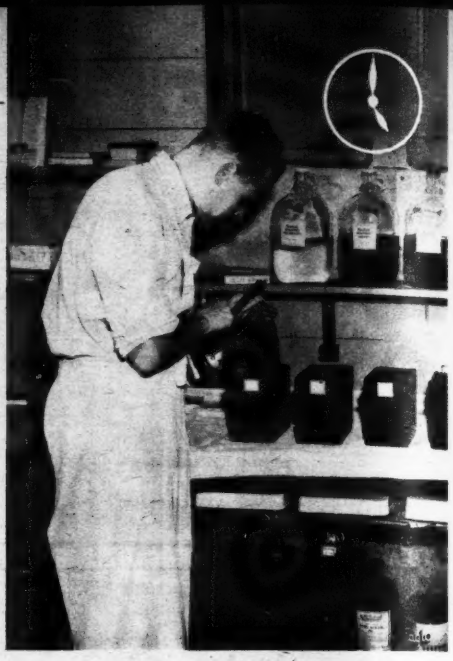
6. Place the film in the bleaching solution and rinse after 10 minutes.

7. Use the same clearing and fixing bath (step 5) to fix the film for 5 minutes. The color is still visible

The water lilies were taken at 1/10th of a second, f-4.5, hazy sun. An 85B filter converted the film.



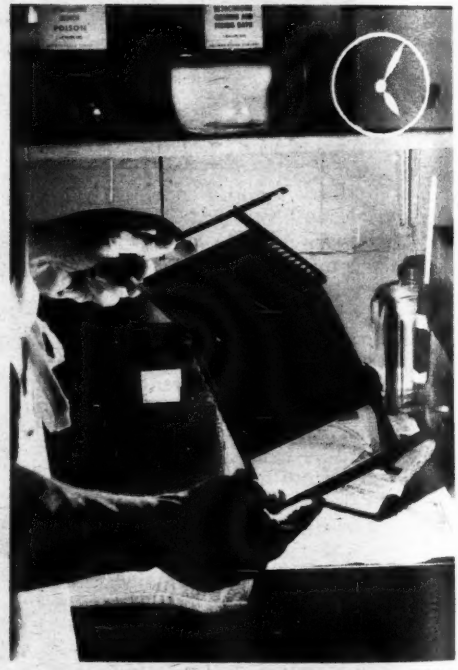
Setting time for first 15-minute developer. Total processing time is about 90 minutes.



After removing films from first developer they are rinsed for one minute in running water.

by transmitted light but opalescence is gone. Film appears blue-green on one side and brownish on the other.

Final operation consists of washing the film for 10 minutes. At this point, you'll be terribly disappointed with the apparent results of your first attempt at processing Ektachrome. The film looks dense and muddy and you are positive that Eastman somehow or other has made a serious mistake. However, don't worry. Once the transparencies have dried, all the colors come up in their proper hue. If you have an infra-red lamp by all means use it. This will hasten the drying operation and thus alleviate your distress. When the brown side starts to exhibit dark patches, drying is well on the way. For your own peace of mind, it's best that you go to bed and then dash down in the morning after a good night's rest. You'll be agreeably surprised to find that Eastman after all didn't make a mistake. Your transparencies are there, trembling on the line in all their pristine glory, faithfully exhibiting all the hues of the original scene.



A nine-minute hardening bath is followed by reversing the Ektachrome over a Photoflood.

Split-tail Bonanza

BY G. R. COLBY

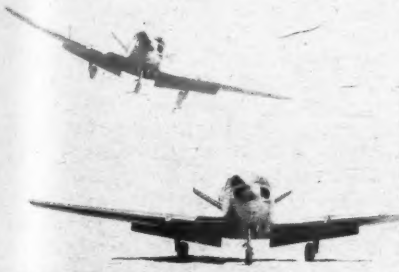
Yes, Beech has a bonanza and from its looks they won't need a Chiquita to sing it into popularity.

If back-seat flyers insist, she can move the wheel over to hubby.

FROM the veteran design staff of Beech Aircraft comes the butterfly-tailed Model-35 "Bonanza," designed and built, not for limp-sock weekend flying, but for real utility use.

Pioneering in many details for the private plane, this four-place, all-metal, low-wing job is earmarked primarily by its unique tail design featuring "ruddervators" rather than the usual vertical rudder and horizontal stabilizers.

This tail, although not altogether new in aircraft design, has never been incorporated in an aircraft of this particular class. Its advantages are found in less aerodynamical drag, better stability, lightness, low cost, and easy replacement and maintenance. With it, the Bonanza makes perfect turns without use of the rudder pedals and the pilot, not having seen the V-tail, would be unaware of its presence.



is one new point of wing design however and that is the unusual angle of attack of the wing when in taxiing position. The angle of attack is increased when in ground position which helps lift the tri-gear out of the soft field surface. This cuts down wheel drag and shortens the takeoff run required.

When the door opens, a small retractable step is available for the use of ultra dignified passengers or the gals without slacks. The door opening itself extends into the curve of the roof of the cabin to do away with [illegible] as the passengers enter or [illegible]

As you [illegible] the door and enter [illegible] the deluxe appearance [illegible] Full wall-to-wall [illegible] cabin roof light and [illegible] and wide seats give

[illegible] plane of this capacity [illegible] with a Continental [illegible] der, [illegible] engine equipped with a pressure carburetor, delivering 165 hp at sea level at 2050 rpm's, the ship has a top speed of 184 mph, a cruising speed of 175 mph, using 115 hp at 10,000 feet, and a landing speed with 30 percent flaps of just over 45 mph. The range of the Bonanza at cruising speed is 750 miles, the rate of climb is 950 feet per minute and the service ceiling is 18,000 feet.

Empty, the Bonanza weighs 1,490 lbs, gross weight is 2,550 lbs, with a useful load of 1,060 lbs. The payload with full tanks of gas is four 170-lb passengers and [illegible] lbs of baggage. The [illegible] partment has a capacity [illegible] feet and is reached [illegible] door on the right.

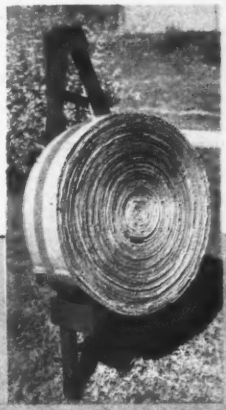
Cardboard Archery TARGET

Roll your own target from box strips and cut equipment costs.

HERE'S a long-lasting target that you can make by taking apart those boxes the grocer leaves every week, and cutting them up into 7 in. strips. Roll the strips separately first to make them more flexible and then start rolling the drum as tightly as possible. At every few inches, drive a No. 4 nail and after 5 or 6 layers are done bind a wire around the drum. Repeat this process until it is about 25 inches in diameter. To hold it together, use a wire binding or a canvas strap drawn tight and riveted.

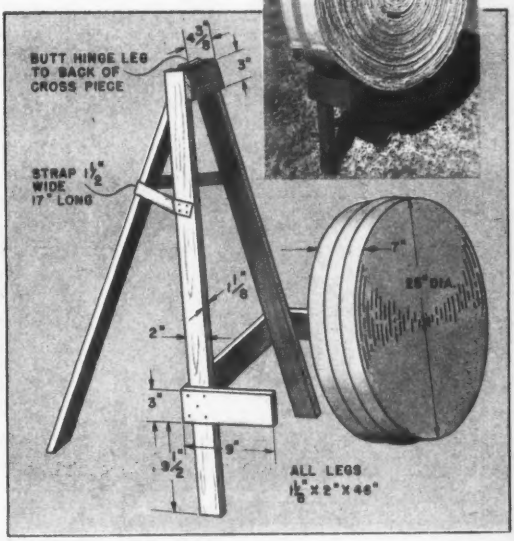
The wooden easel is then made from scraps of wood, following the drawing for dimensions and details. The strap used to hold the hinged rear leg can be made from an old canvas belt. The easel is slightly lower than standard but is much safer for back yard practice. For open range use, the uprights should be extended 9 inches and the lugs that hold the drum set 18 inches above the ground.

The target set up for back yard use. It's easy on the arrows as well as the eyes.

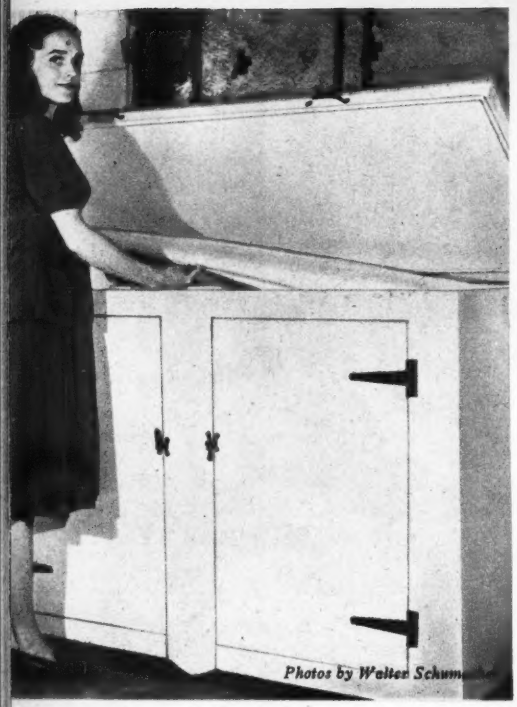


Drum rolled and bound with canvas strap. Standard printed bulls-eye targets are used on the face.

Driving a nail to keep the strips from slipping. Drum should be wound tightly.



Construction of the easel is simple. Drum rests on lugs which project from the frame.



The happy housewife shows the space for the ironing board. Your friends will never guess that this trim cabinet conceals a pair of dingy tubs.

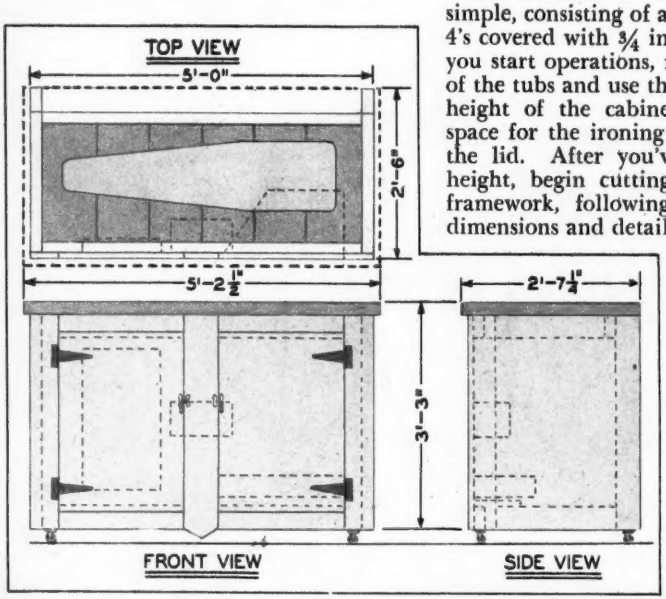
Removable WASHTUB CABINET

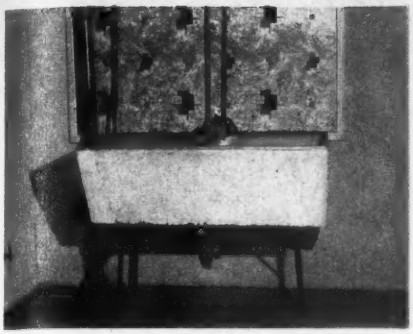
Modernize your basement with this roll-a-way unit that provides space for everything—including the sink.

BY O. NORTRUP

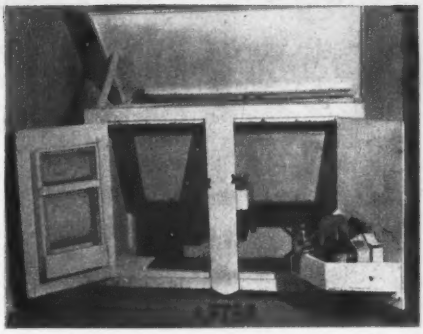
IF THE lady of the house has been complaining about those eyesores in the cellar, the old-fashioned laundry tubs, then build this modern cabinet and turn her frowns into smiles. She'll not only like the improved appearance of the cellar but she'll appreciate the utility of the cabinet as well. In addition to hiding the tubs, it provides storage space for the ironing and wash boards, laundry supplies and the electric iron. As the unit's on wheels, it will also pinch hit as a table or a refreshment bar for more festive occasions.

The construction of the unit is quite simple, consisting of a framework of 2 by 4's covered with ¾ in. plywood. Before you start operations, measure the height of the tubs and use this to determine the height of the cabinet, leaving enough space for the ironing board shelf under the lid. After you've decided on the height, begin cutting the parts of the framework, following the drawing for dimensions and details. Finish the ironing board shelf and the corner bracing before you cover the frame. Following this, cut the doors to size and install the shelf for washing supplies and the rack for the washboard before you hang the doors in place and add





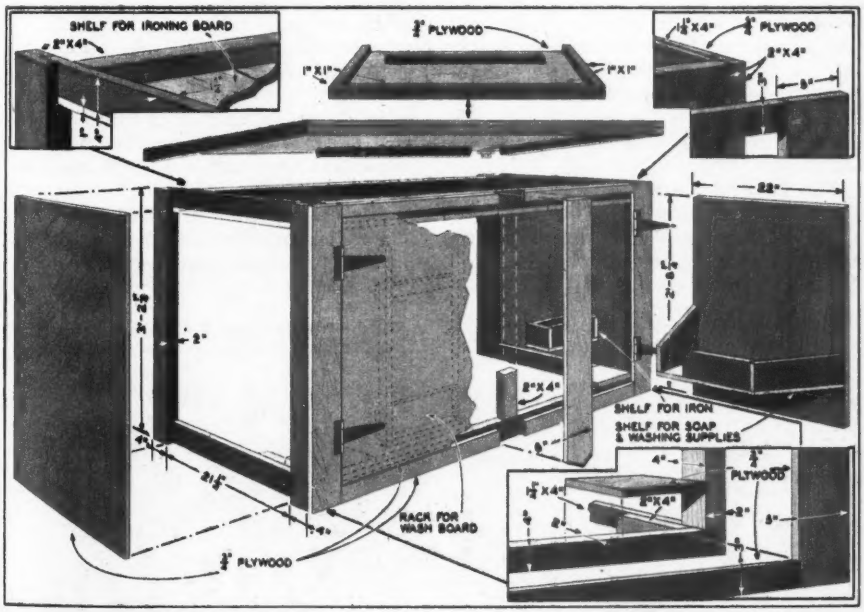
Just another laundry before the cabinet was made. Note the linoleum-covered splash board.

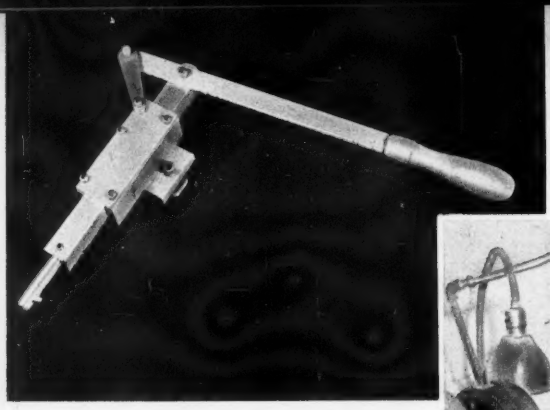


See what a difference the unit can make. A place for everything and everything in its place.

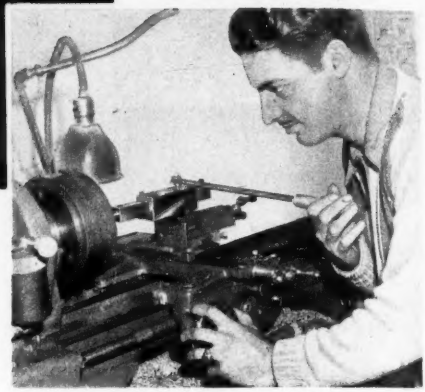
the hardware. The lid is then cut to size, the framing nailed in place and any necessary openings cut in the rear edge to fit around water or drain lines that may run behind the unit. Screw the hinges in place and hang the lid on the framing. A pair of handles screwed to the front edge will make it easier to lift up. The last step of the construction, is to install four casters, one under each of the corner posts.

Before painting the cabinet, cement or tack linoleum to the top of the lid to prevent wet clothes or liquids from warping it and also to make it easier to keep clean. Any small piece of linoleum that's left over can be used to good advantage on the shelf for the laundry supplies. The original cabinet was given a coat of flat white paint, followed by several coats of white enamel. For a really smooth finish, sand the enamel lightly between coats. All exterior hardware on the unit such as the handles, hinges and door latches was painted black for contrast. A splash board made up of a plaster board backing covered with linoleum (to match that on the cabinet lid) can be mounted on the wall behind the tubs and will help brighten up the laundry corner of the basement.





Left: Close-up view of the completed tool illustrating its sturdy yet simple construction. Below: Unit mounted on a 10-inch Atlas.



SLOTTING ATTACHMENT
FOR YOUR LATHE

BY AL SPAMPANI

OFTEN, in the home workshop, the need arises for a method of cutting slots in gears, splines and making oil grooves. The average shop is usually without a milling machine, so this slotting attachment should prove invaluable.

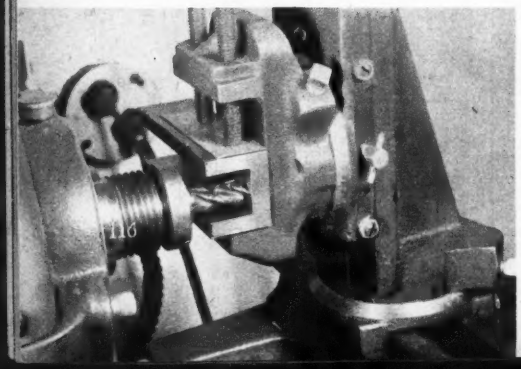
The ram housing is machined first. Clamp the 1¼ in. sq. cold rolled steel housing stock in your milling attachment and indicate the stock so the face is perpendicular with the spindle center and also parallel with the ways of the lathe. Cut the U-slot with an end mill, exercising extreme care since the slot serves as a bearing for the ram. Cut the slot as shown on the drawing and fit the ram into it before removing.

The housing cover is layed out and drilled in a drill press vise. After the cover is drilled, clamp both cover and ram housing together and spot the holes in the housing. Drill and tap as illustrated.

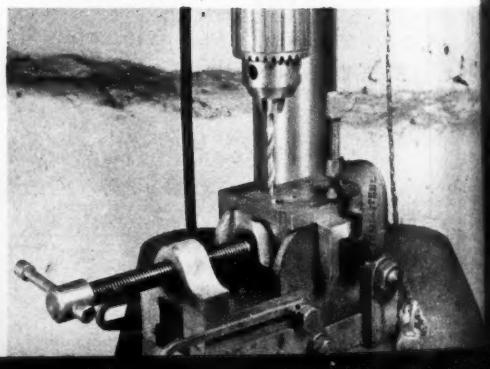
The ram housing base is layed out as indicated on the drawing and the holes drilled and counterbored. Clamp the housing and base together and spot the holes in the housing. Drill and tap the housing for the screws and assemble on the base. The locating key is cut so it fits firmly into the compound rest slot of your machine. Drill the two ¼ in. holes in the key and countersink the holes to accommodate a ¼ in. flathead screw.

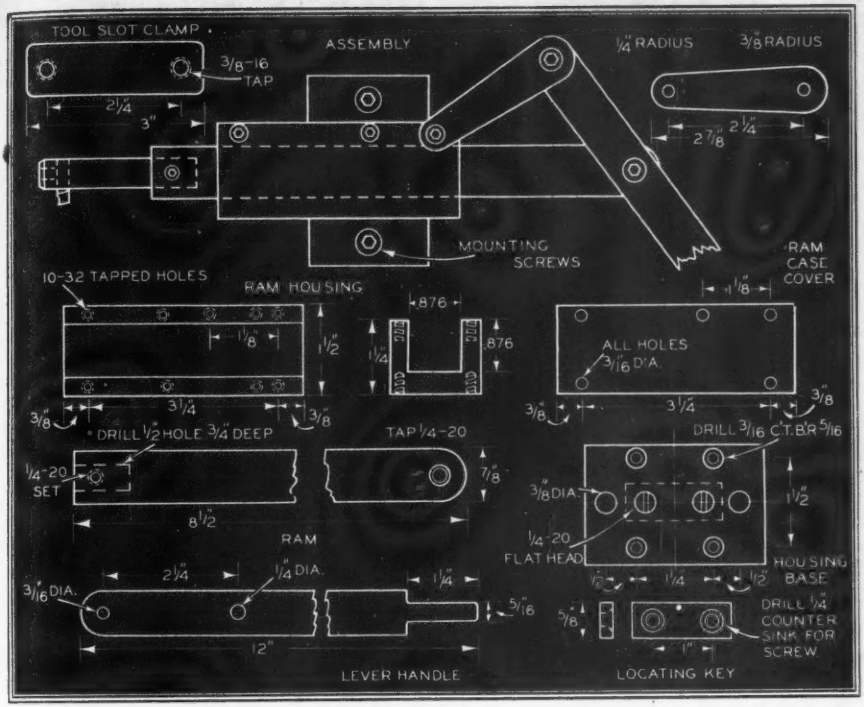
The tool slot clamp is drilled to conform with the two holes in the ram housing base and is tapped for ⅜-16 hollow-head bolts. The ram case and base assembly is next clamped to the machine and indicated so the U-slot is perfectly parallel with the spindle centerline. When it is in perfect alignment, scribe the bottom of the ram case base to give you

With the housing stock accurately set in the milling attachment, cut the slot with an end mill.



With base plate clamped to housing, spot holes. Remove plate and then drill holes in housing.

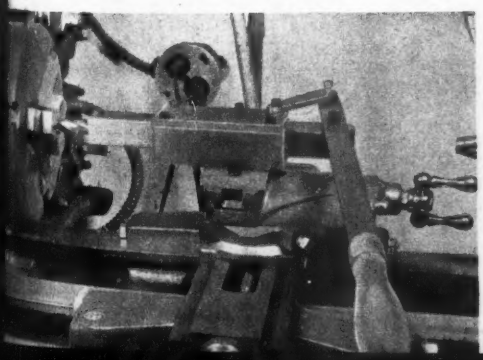




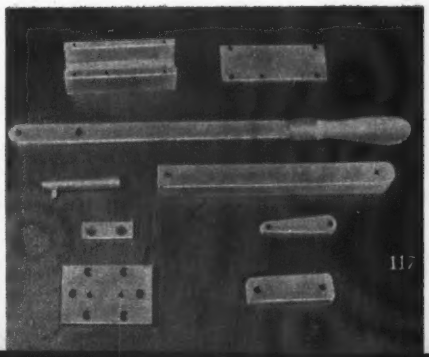
the location of the compound rest slot. Take the attachment off and accurately lay the locating key on the scribe marks. Clamp the locating key and the ram case base together, spot the two 1/4 in. holes on the base, drill and tap the base for the 1/4-20 screws and then assemble. Next, drill the 1/4-20 hole in the ram and round off the end as shown. Follow by assembling the ram and ram case cover. The linkage for the handle is made from 3/16x3/4 in. flat cold rolled steel, as shown on the drawings. A self threading file handle is screwed on to the lever end. Assemble all the linkage and mount the slotter on your compound rest.

The boring bar is now drilled. Chuck a 1/2 in. drill, clamp the ram in the furthest outward position and feed the ram into the drill. Next, drill the boring bar holes and then ream them to fit the tool bar. The tool bar is made from a piece of drill rod drilled to receive a tool bit. Drill and tap the tool bar and then insert the bar into the ram after the ram is drilled and tapped for the setscrew.

Mounted on your cross slide, feed the ram into drill to gain perfect alignment for the cutter bar.



Disassembled to show its few parts, the project is within the reach of every home shop machinist.



"Pill Box" RADIO

A mite-sized set that will keep junior happy, and away from the family's big radio.

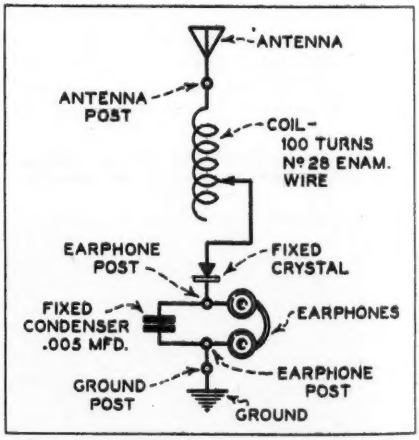
BY HARRY HIRSCH

HERE'S a radio receiver so small that it can be built inside a slide-type pill box easily obtained from the local druggist. The set uses a simple crystal circuit and will give the children many pleasant hours of listening in return for the small amount of labor required to make it. The cost is very low as most of the parts can be found among the odd radio parts in every home workshop. The only thing that need be purchased is the fixed type crystal detector. As for the set's performance, with a 75 ft. antenna and a good ground the results will be most satisfactory.

The box used to house the receiver is known to druggists as a No. 49x pill box and measures 3 by 2 by 1¼ inches. The slide part is prepared first by inserting four terminals made from ordinary shoe eyelets with soldering lugs attached. Bending the lugs as shown in the photos makes them serve as tight connections for the phones, antenna and ground. The next step is to glue a strip of ¼ in. plywood as long as the box and 1¼ in. wide, to the inside of the bottom. While this is drying, you can go to work on the tuning coil.

This is wound on the outside cover of an ordinary match box and consists of from 90 to 100 turns of No. 28 enameled wire. To support the cover during the winding operation, fit a piece of wood inside it and insert a ¼ in. dowel at one end. By cutting the wood diagonally, it can be wedged into the cover. The winding machine shown in the photo consists of a hand drill set in a vise and with the dowel held by the chuck. Before starting the work, locate two holes ⅛ in. from each end of the cover to serve as anchor points for the start and finish of the coil. In winding the coil, allow about 3 inches for the leads and space the turns carefully so they fill the area between the two holes.

The pill box is then taken up and in the space alongside the plywood, the condenser is mounted with the fixed crystal beside it and supported by a bent paper fastener as shown in the photos. This crystal is much more sensitive than the old galena type and as surplus material costs no more. One connection of the crystal is then soldered to the phone lug and the other to a clip fastener attached to a flexible wire connected to the slide



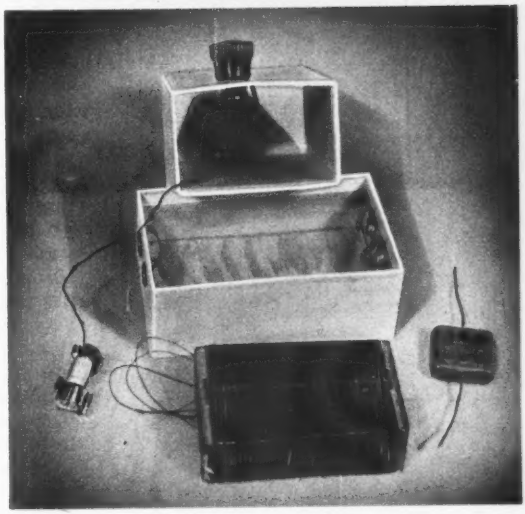
The wiring diagram is simple. The fixed condenser should be the smallest type that can be obtained.

Using a hand drill set in a vise to wind the tuning coil.

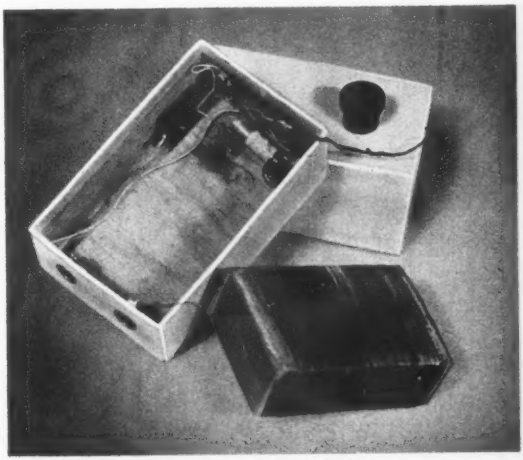
on the cover. A wire is soldered from the other phone lug to the ground connection and the condenser wired as shown in the diagram.

While the coil is still outside the box, solder one lead from it to the antenna lug, scraping off the enamel before doing the soldering. The other lead from the coil is cut to a length of one inch and bent under and out of the way. The coil is then inserted in the box, first placing a small amount of glue or cement on the bottom to hold it in place.

The slide on the cover is made next, using a small piece of spring brass with a ½ in. 6-32 screw, with the head removed, soldered to it. The other end of the flexible wire from the crystal clip is now soldered to the spring contact. A hole is then drilled in the cover of the box so that it is about over the center of the coil and ⅝ in. from the end so the contact will clear the space inside the box. Before slipping the cover over the box, remove the enamel in the path of the sliding contact by wrapping a piece of No. 00 sandpaper around a thin piece of wood and move it slowly back and forth until the bare copper shows. With the contact in place on the cover and secured with a binding post cap, the cover is then slid over the box. A pair of earphones of the 2,000 ohm type are connected to the phone eyelets and the antenna and ground connected to their respective eyelets. Slide the cover of the box slowly across the coil and sweet music will greet your child's ears to keep him amused.



Above: Parts completed and ready for assembly and wiring. New type fixed crystal is at left—small condenser at right.



Pill box with condenser and fixed crystal wired in place.

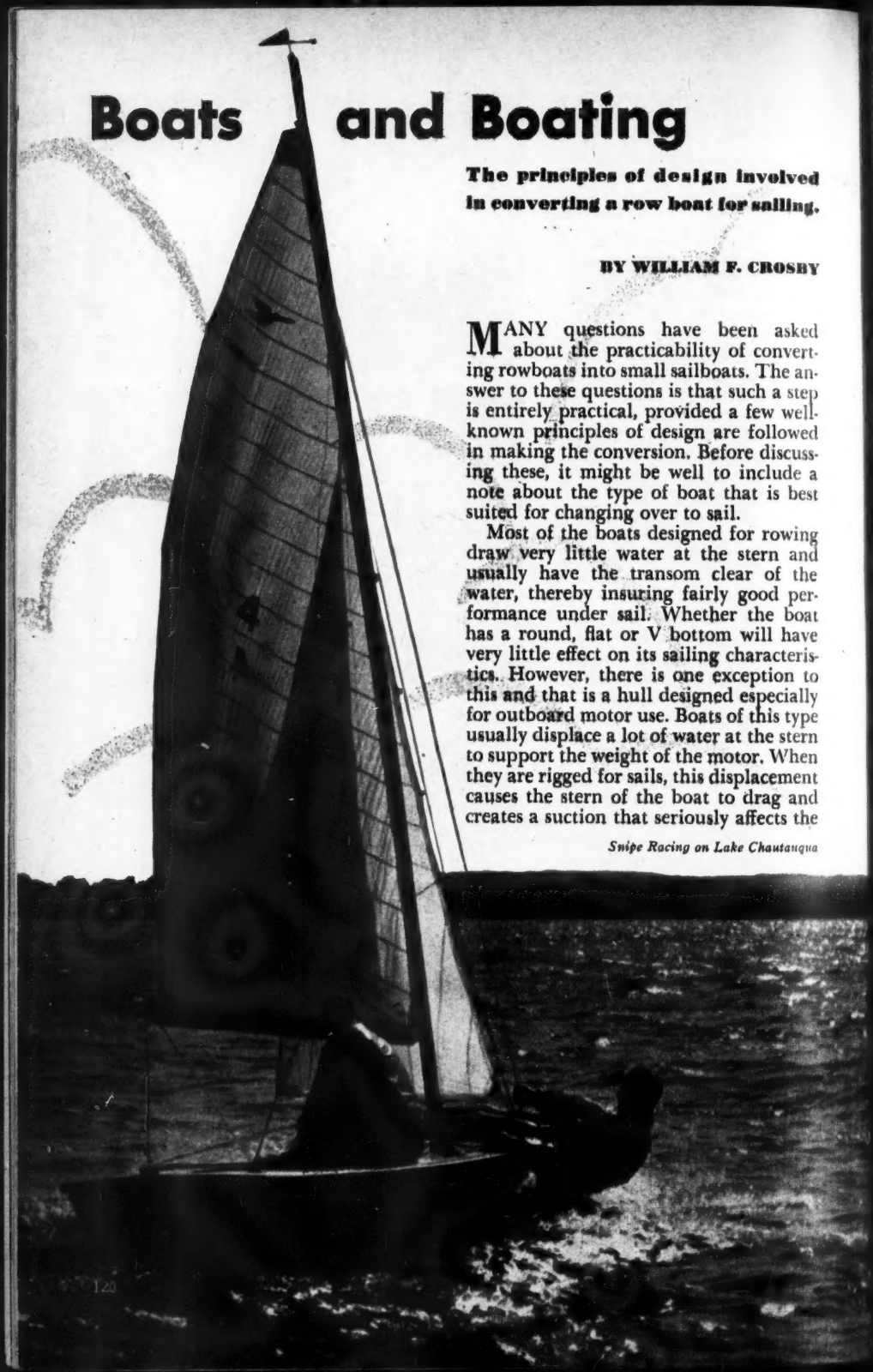
Boats and Boating

The principles of design involved in converting a row boat for sailing.

BY WILLIAM F. CROSBY

MANY questions have been asked about the practicability of converting rowboats into small sailboats. The answer to these questions is that such a step is entirely practical, provided a few well-known principles of design are followed in making the conversion. Before discussing these, it might be well to include a note about the type of boat that is best suited for changing over to sail.

Most of the boats designed for rowing draw very little water at the stern and usually have the transom clear of the water, thereby insuring fairly good performance under sail. Whether the boat has a round, flat or V bottom will have very little effect on its sailing characteristics. However, there is one exception to this and that is a hull designed especially for outboard motor use. Boats of this type usually displace a lot of water at the stern to support the weight of the motor. When they are rigged for sails, this displacement causes the stern of the boat to drag and creates a suction that seriously affects the



Snipe Racing on Lake Chautauqua

sailing qualities. For this reason, it would be very inadvisable to attempt converting an outboard hull into a sailboat.

The first thing you'll require in adapting your boat for sail is a scale drawing of the hull profile similar to that shown in Fig. 1 for a typical 14 ft. flat-bottom rowboat. To draw one for your boat, begin by determining the normal waterline, either from the paint line or the "whiskers," and mark it accurately on the hull itself, while it's afloat. The boat should then be brought ashore and levelled up, using the waterline as a base. Next, measure the overall length at the center (fore-and-aft) and using a scale of one inch to the foot, lay it off on paper. Then by hanging a plumb bob at bow and stern, measure the amount of overhang and the distance from the waterline to the deck at both points and scale these dimensions on your paper. After drawing in the outline of the stem and transom, divide the boat into three or four equal sections as shown in the drawing. At each section, measure the distance up from the waterline to the deck (sheer) and down from the waterline to the lowest point on the bottom of the hull. Lay off these dimensions to scale on the paper and draw in a fair curve through each point. You will then have a scale profile of your boat similar to that shown in Fig. 1. The dimensions described above are marked "X" in this drawing.

The next point to consider is that the sail areas for various small boats depend to some extent on the local weather conditions under which the boat will be operated. For example if it blows hard most of the time in your vicinity, your sail area should be smaller than on some inland pond where the winds are apt to be light. The figures in the following table will give you some idea of the average sail area for medium conditions and for best all around results. The rig used depends upon the overall length of boat.

A typical flat-bottom rowboat suitable for converting into a small sailboat. A cat rig would be used.

Length of Boat	Average Sail Area	Type of Rig Best Suited	Average Centerboard Area
8 ft.	35 sq. ft.	Cat rig (mainsail only)	2.75 sq. ft.
10 ft.	60 sq. ft.	Cat rig (mainsail only)	3.00 sq. ft.
12 ft.	85 sq. ft.	Cat rig (mainsail only)	3.50 sq. ft.
14 ft.	115 sq. ft.	Jib and mainsail	4.25 sq. ft.
16 ft.	135 sq. ft.	Jib and mainsail	5.50 sq. ft.
18 ft.	175 sq. ft.	Jib and mainsail	8.00 sq. ft.

The above areas should not be taken as exact but will give some idea of the approximate area for the overall length.

The placement of the mast and sails in relation to the underwater surface of the hull is the secret of success in having a well-balanced boat. On the profile drawing previously mentioned, you can work out the sail plan and the shape and relation of the centerboard to it. To begin this, sketch in your centerboard about as shown in Fig. 2. Then place several sheets of carbon paper face down beneath the drawing, and under these place a sheet of stiff cardboard. Next, trace the outline of the underwater part of the hull and centerboard, omitting everything above the waterline. Then cut out this part of the cardboard and push a pin through it as close to the waterline as possible. When you arrive at the center of lateral plane, the silhouette that you have cut out will balance evenly with its waterline on a level plane. The center of effort of the sails doesn't come directly over this point, but will lie somewhere between 4 and 7% of the water line length ahead of it.

The method of determining the area of a triangular sail, either mainsail or jib, is illustrated in Fig. 3. Here a line is drawn at right angles to the leech and extended to the tack of the sail. This distance is measured and converted into feet and decimal parts of a foot. In this case 8 ft. 9 in. becomes 8.75 ft. This figure is then divided by two and multiplied by the length of the leech (20 ft. in this case), giving the sail area in square feet (87.500).

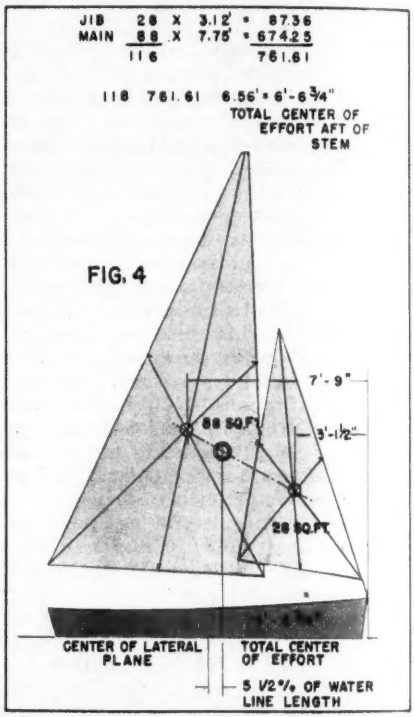
To find the center of effort for the mainsail and jib and the center of effort of the sails together, the method illustrated in Fig. 4 is used. With this, the length of the foot, leech and luff for each sail is divided by two and the mid-way point for each dimension marked off. Lines are then drawn from these points to the corners of the sail and the point where all of these lines intersect is the center of effort for the particular sail. To determine the center of effort for both sails together, the area of the jib (in this case

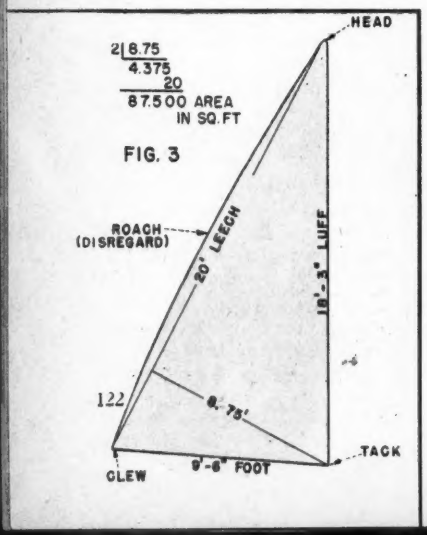
28 sq. ft.) is multiplied by the distance its center of effort is from the stem of the boat (3 ft. 1½ in.), giving a result (87.36) which is called the moment.

The same method is used to obtain the moment of the mainsail (674.25). Referring to the calculation shown at the top of Fig. 4, the areas are added together and the resulting figure (116) divided into the sum of the moments for both sails (761.61). The result obtained is the distance the center of effort for both sails is from the stem of the boat. This comes out in feet and decimals, 6.56 ft., which converted to feet and inches is 6 ft. 6¾ inches. This point is then accurately located by scale on the drawing and the entire rig moved forward and aft until the center of effort lies somewhere between 4 and 7% of the waterline length. In the boat used as an illustration, the waterline length is 13 ft. 3 inches and the mast and rig were so placed that the center of effort came a little more than 7¼ inches forward of the center of lateral plane or about 5½% of the waterline length. Thus the proper sail area is known and the boom and mast can be made accordingly. The dimensions of the sails can be given to a sail maker and the sails made. The centerboard can also be made according to the dimensions on your drawing and the location of the centerboard pin and slot for the board determined as well.

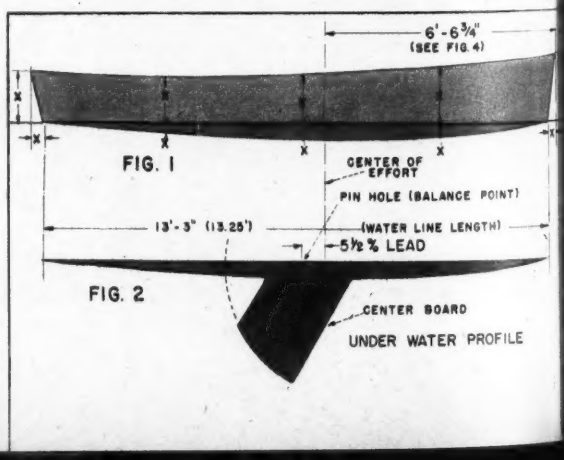
Many row boats have a skeg aft to make them row in a straight line and also to improve their towing qualities. If the boat you're converting has such a skeg, it should be included in your lateral plane drawing. However, don't include the rudder in this drawing, if there's one on your boat. If the performance of your boat under sail doesn't live up to expectations, removing the skeg completely may do the trick.

Another point to watch in making a conversion is the narrow keel on some row boats. You may have to widen this before cutting a slot for the centerboard.





Drawings used to determine underwater profile of boat, center of effort of sails and location of centerboard. If rowboat has a skeg, it should be included in profile.



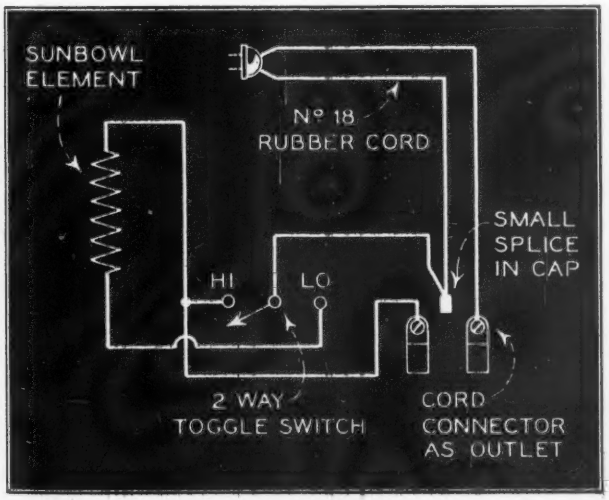
Soldering Iron Heat Controller

The completely assembled controller, ready to be plugged in.

THIS simple control unit will prolong the life of your iron and eliminate those annoying delays waiting for it to warm up during a long session of soldering. In operation, the iron can be left on the low heat while not in actual use but is quickly restored to the normal high heat by a flip of the switch.

The unit consists of the iron stand, a porcelain socket for the sunbowl heater element, the switch and an ordinary cord connector, all mounted on a 4½ by 11½ in. base made of ¾ in. hardwood. The cord connector is fastened to the base by means of a metal strap and two screws. After all the parts are in place, the unit is wired up, using the diagram as a guide. By changing the resistance of the heater element, the temperature of the iron on low heat can be varied as desired. In the original controller, a 660 watt element was used with a 100 watt iron, reducing the current at the iron to about 90 volts. This will furnish a safe comfortable heat for an indefinite period but it is still hot enough to solder small parts. By using an element with a higher resistance, the temperature of the iron can be decreased to any desired point.

—*Harold P. Strand*



Wiring diagram. Switch is mounted on bracket.

BY ARMAND VASQUEZ

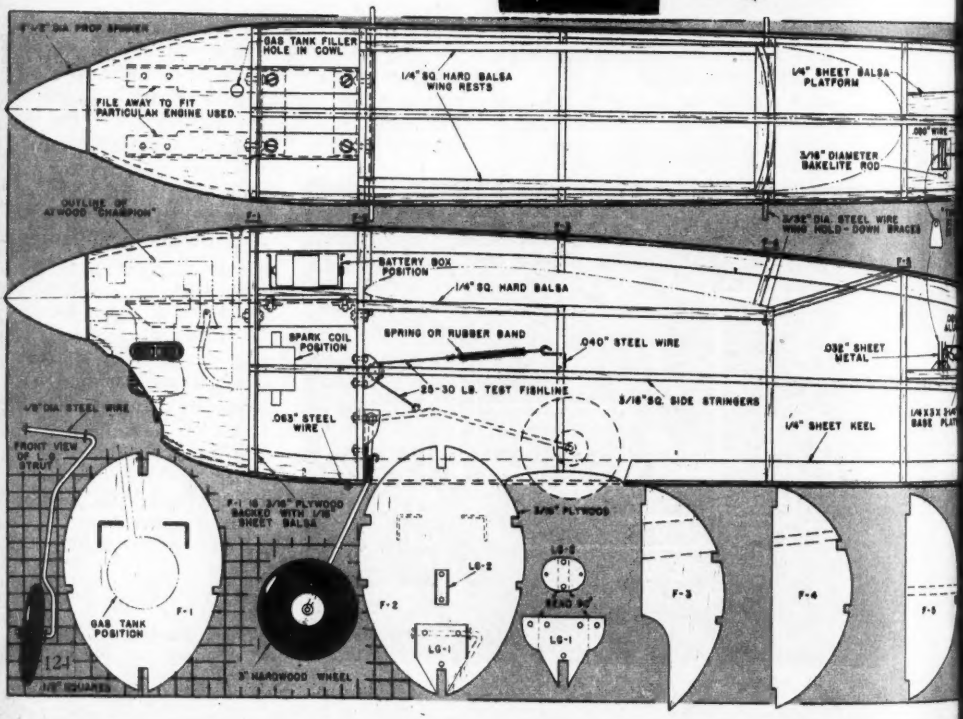
pylon buster

A contest winning super-streamlined class C gas model featuring an ingenious glide control mechanism. A real threat for pylon competition.

HERE is a gas model that is a contest threat in every sense of the word. It was designed with just one thought in mind—to prove that "pylons" are not necessary. The consistent and high performance this model turns in is a direct result of the constant improvement and refinement that has gone into several models of the same design during the past three years. And the way Pylon Buster behaves under power is a tribute to the engine manufacturers. With so much power available in the present day en-

Author and model. Construction is sturdy, within reach of average builder.

MI Staff Photos



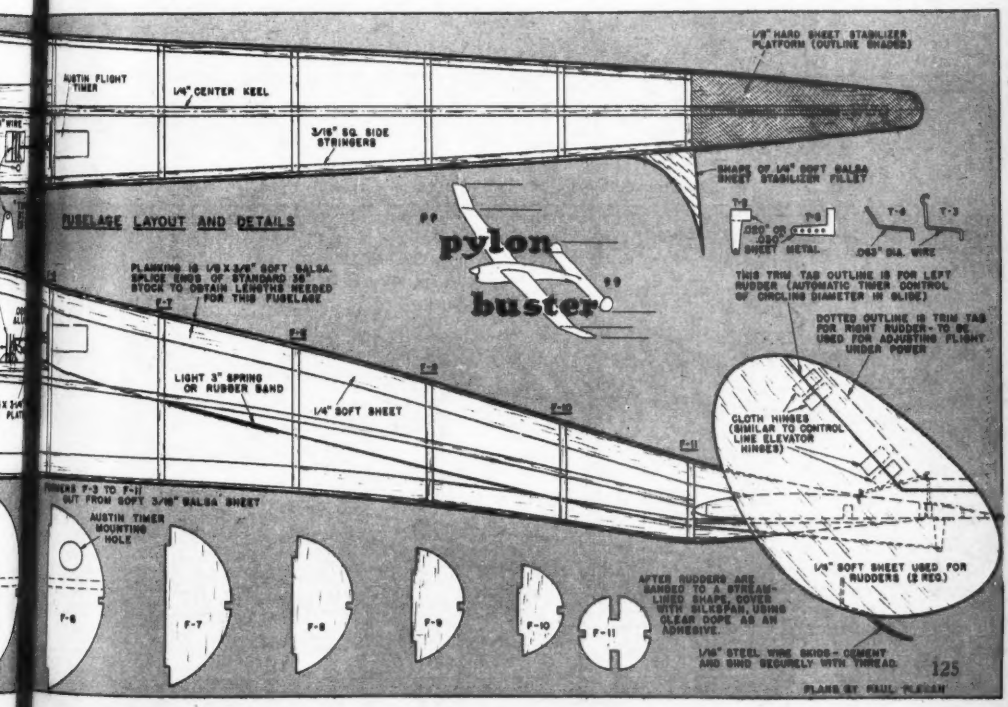
Low stabilizer position and high aspect ratio of wing also add to the very flat glide.

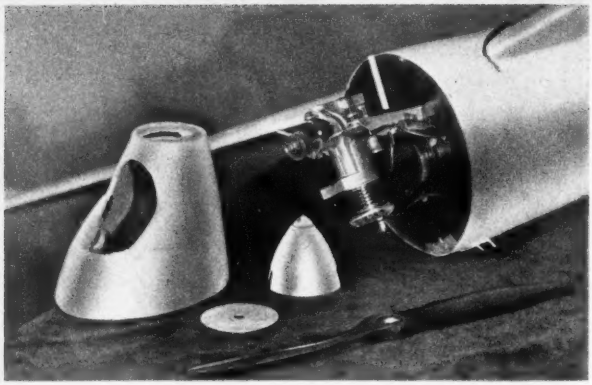
gines packed into such a slick job—well, you just can't go wrong.

The secret to Pylon Buster's high rate of climb (straight, not spiral) and very flat glide lies in a very simple yet foolproof tail adjustment mechanism which is hooked on to the ignition timer. After the engine cuts, the elevator moves slightly up and the left rudder turns automatically, resulting in a flat circling glide to the right. Actually, the job has two sets of flight adjustments—one for climbing and one for gliding! The original model was powered with an Atwood Champion engine but the Hornet, McCoy, "OK" 60, Ohlsson 60 or any top displacement class C power plant can be used.

Due to the large size of the model and preponderance of curved parts, it would be wise to obtain full size plans from your hobby shop in order to save time and effort in scaling up the plans presented on these pages.

Wing construction is of the conventional type but the very thin airfoil (Goldberg G-7) and high aspect ratio makes it imperative to exercise the utmost of care when selecting the wood and during actual construction. The front and rear spars are very hard balsa while the tips, leading edge, ribs and trailing edge are of medium grade stock. The wing is



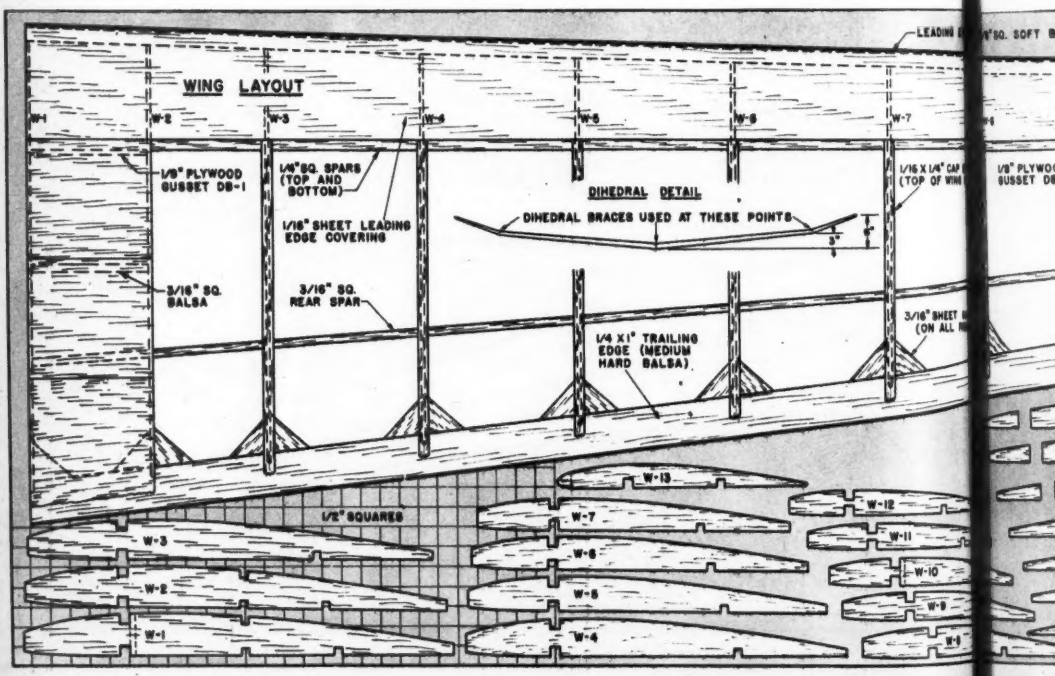


View showing Atwood engine. Remove Fromm spinner and back washer to take off cowl.

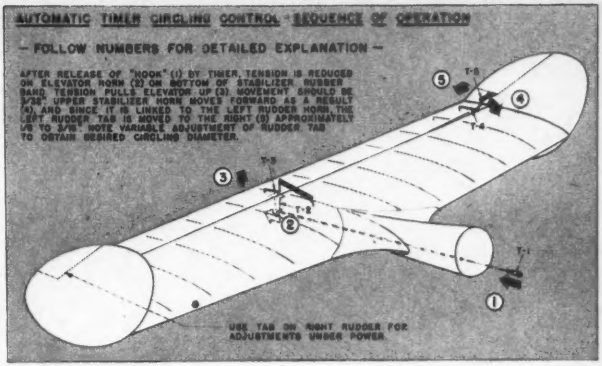
built in two halves and then joined. Cut out the ribs and cement them to the lower main spars, which are pinned directly to the plan. Add the trailing edge and then cement the upper spars in place. The leading edge and trailing edge gussets are next cemented in place and the panel removed. The space between the top and bottom spar is now filled with 3/32 in. sheet stock, the panel severed at W-10 and the 3 in. tip dihedral added.

Next, cover the top portion of the leading edge with flexible $\frac{1}{16}$ in. sheet balsa. Add the solid tips and the cap strips to the top of each rib and then sandpaper the entire panel so all joints are absolutely flush. A length of 18 pound fish line is now cemented along the leading edge and the panel set aside until ready to be joined to the left panel, which is made in precisely the same manner as the right after the outline has been traced through the plan or else on a piece of tracing paper. Once both panels are complete, join them so the prescribed dihedral angle exists. After the dihedral reinforcements are in place, cover the center section with $\frac{1}{16}$ in. sheet.

Before covering the wing, apply two coats of clear dope where the covering will touch the wood and then cover with wet Silkspan. Silk, if available, is preferable but double-Silkspan (cross-grained) will suffice. Use plenty of water on the Silkspan and when the panel is dry, dope once and add the second layer. Three coats of clear



Automatic elevator and rudder adjustment is simple, foolproof. Glide trim is on left rudder.

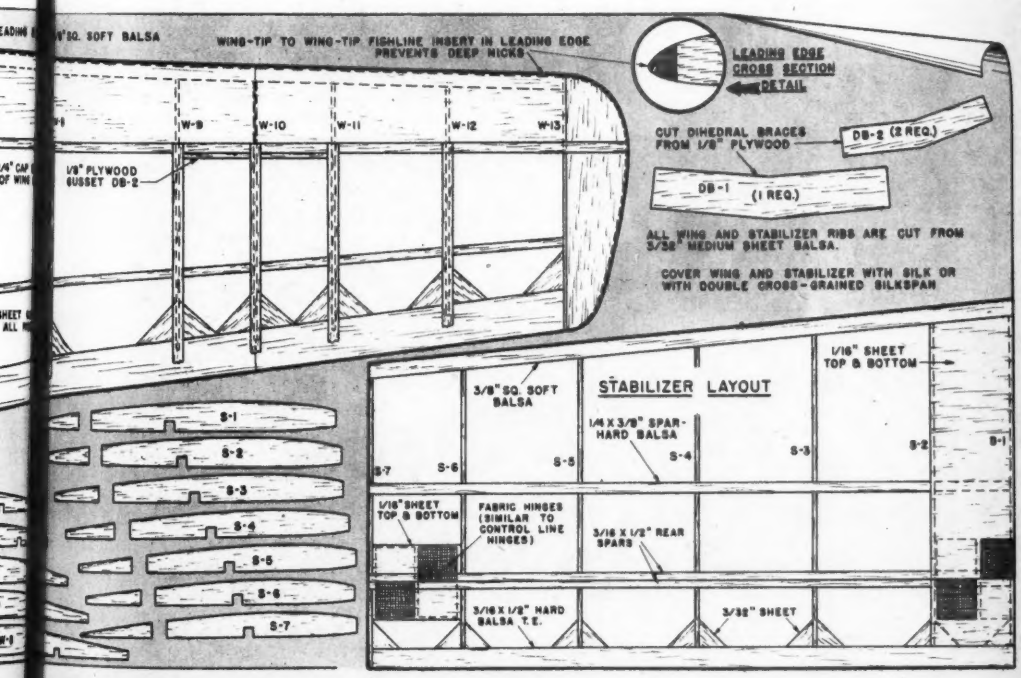


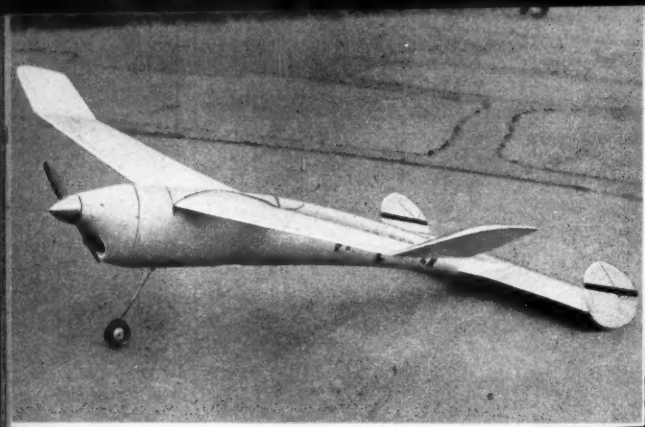
dope or your favorite color will complete the wing.

The stabilizer is built in one piece, making it necessary to pin a full length spar and trailing edge to the half shown on the plan. The ribs, trailing and leading edge are assembled over the left half shown on the plan. When the glue has dried, remove the structure from the plan, trace the outline and finish the right half. As mentioned previously, the flight secret of the Pylon Buster lies in the automatic tail control so make certain the elevator movement is easy. Cover the stabilizer with wet Silkspan and then proceed to carve the vertical surfaces, which are cut from 1/4 in. sheet stock and sanded to a streamlined airfoil. Cement fish line around the edge, cover with Silkspan and then cut away the section to be hinged. Cement the fins to the stabilizer and then complete the control system, as detailed in the drawing shown directly above.

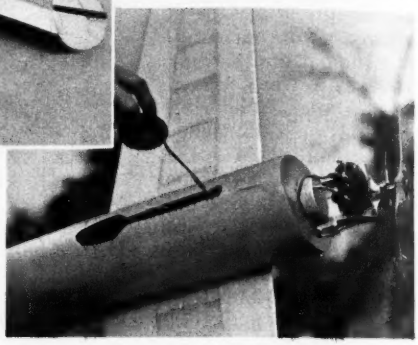
After the elevator and rudder horns are in place, hold the elevator in neutral and make adjustments on the horn so the rudder is also in the neutral position. Now move elevator 3/32 in. up. The rudder should turn automatically 1/8 in. to the right. This movement gives the required flat circling glide so desired for high performance. Finally, bend to shape the two horns to be cemented to the center of elevator and lay the assembly aside.

The fuselage, with its unorthodox shape, is very clean and is no more diffi-





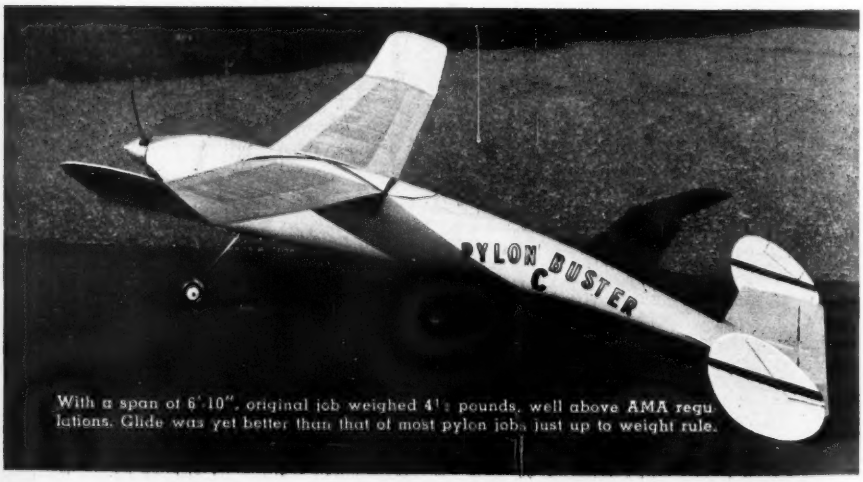
Left: Rubber actuated single strut landing gear retracts once the model becomes airborne. The very low stabilizer and wide rudder skid tread insures good, stable take-offs. Below: Close-up view of the well into which gear strut and wheel retracts. Cut fuselage to fit the wheel used.



cult to build than the average bulkhead-type structure. It is made in two sections, the nose unit of which is composed of formers F-1 and F-2, with the aluminum motor mounts acting as a backbone. After this structure has taken shape, add the landing gear details and set aside until the main section is ready for joining.

In making the main section, cut the keels from 1/4 in. hard sheet stock and pin over the plans. Cut out two halves of each bulkhead (unless otherwise indicated) and cement the left half to the keel. After the cement is dry, remove the structure and attach the right bulkhead halves. The two side stringers are now attached, exercising special care so the fuselage does not warp. Add the nose section and then insert 1/4 in. square stringers between formers F-2 and F-4 to form the wing mount.

Installing the automatic tail adjustment mechanism is the next chore. Set a piece of .032 wire on the Austin timer arm, wrap well with thread and cement. Adjust the timer for 24 seconds, mount in place and add the peg and "stops." The timer extension wire passes through the three "stops" with the controlling hook slipped between. When the timer cuts, the hook is released and the elevator and left rudder assume a new setting for gliding. Adjust the mechanism via trial and error so the engine cuts one or two seconds after the hook is released. Next, set



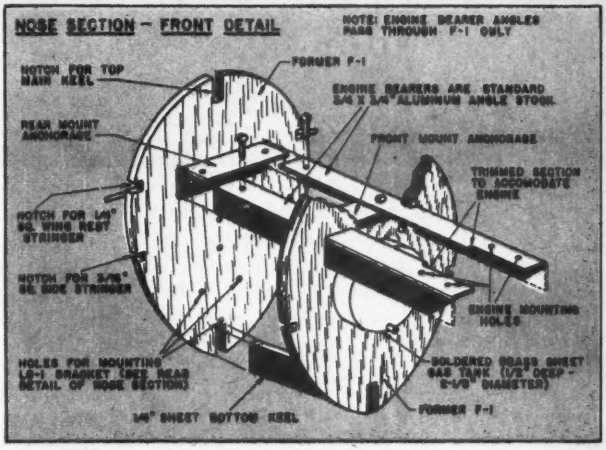
With a span of 6'-10", original job weighed 4½ pounds, well above AMA regulations. Glide was yet better than that of most pylon jobs just up to weight rule.

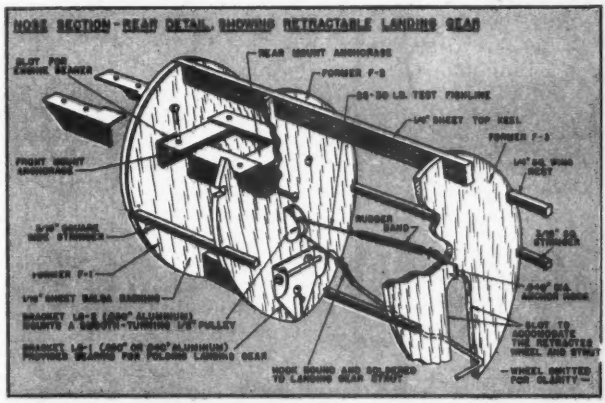
the stabilizer platform in place and then mount the coil and battery box. Better still, use General, Bright Star or Burgess pack batteries and you'll save yourself ignition troubles. Complete your wiring, as given by your engine manufacturer.

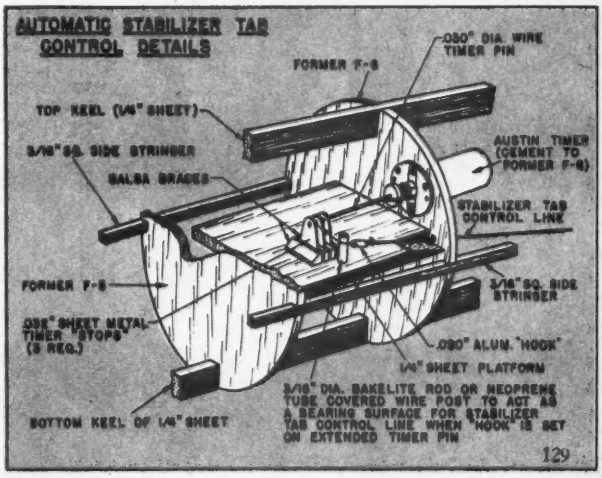
The fuselage is planked with soft 1/8x3/8 in. balsa. Start from a point just below the wing mount and work both sides simultaneously. After planking about 2 in. on both sides remove part of the keel between F-2 and F-3 for the wheel. The cowl is made from solid balsa or built-up blocks if necessary. Lay out the side and top views and carve to fit your engine.

Cement the stabilizer in place, add the fillets and plank from F-11 back. Pin the wing to the fuselage and fit the F-2 to F-5 section to the wing. Plank with care to insure good fit. Insert the dowels or wire rods to hold the wing in place and cut out the doors for battery and control mechanism. Balance your Pylon Buster at a point 50% back from the wing root and glide from a steep incline with the control mechanism hooked up so the elevator and left rudder are neutral. Use right rudder to obtain a slight right circle tendency, just enough to counteract torque. Release the control mechanism, glide the model again and adjust the elevator and rudder setting so a very flat, smooth, circling glide to the right results. While testing at 1/3 power, adjust for a straight power climb or a very right wide circle climb. Increase the power and then—well, bring on the pylon competition!

FULL SIZE PLANS—see page 141







car care

CAME across an interesting sticker the other week. This customer had no trouble with his car until he tried to start it. Starting was always hard even with a warm motor. The battery just seemed to die down whenever he stepped on the starter. Yet, the lights and horn worked and the battery checked OK. Suspecting a faulty cable I took off the front seat for a looksee. There sure enough was the trouble—but not with the cable. The steel springs of the seat were shorting the battery every time the driver braced himself to push down on the starter button.

PISTON RING WORK quite often turns out badly because of failure to consider wear on the ring grooves. After the new rings are installed oil sucks up freely behind them. Measure the groove width and, if wider than normal, just widen them with another 1/32 in. and cut a recess this width in the upper part of the top of each groove. Then lock inserts of the same width into these recesses. When the new rings are installed oil won't suck up behind them, and you won't have to use rings wider than the originals.

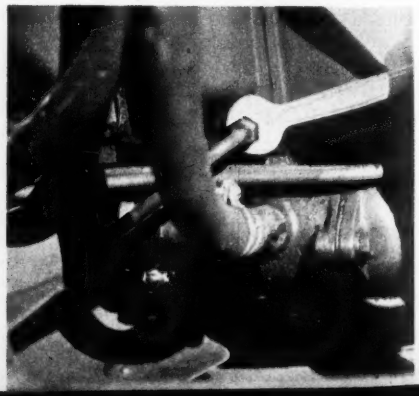
A NEW MUFFLER and tail pipe assembly should not be tightened immediately after replacing. Run the engine (outdoors of course) until the whole exhaust line aligns itself naturally. Then tighten all the bolts and clamps.

USE COLD WATER and a synthetic sponge to clean off the car if you have waxed it. Hot water and chemicals will soften the wax and take it off.

VACUUM OPERATED GEARS will sometimes stay in low or third, if idling speed is wrong. Idling should not be faster than that required to move the car 4 miles per hour in third gear (not overdrive).

STARTER TROUBLE, Reader N. B. L. found, may have nothing to do with the Bendix drive or the starter-motor. In his case the situation was traced to the mechanically operated switch which failed to make good contact.

LEFT: An easy way to find out if your shock absorbers are working is to rock the car by means of the bumper. There should be resistance on the up stroke as well as on the down swing. BELOW: High oil consumption in valve-in-head engines is sometimes due to leakage where the oil lead enters the valve compartment. Always be sure that the nut at the union is drawn up tight with a wrench.



UNDER THE HOOD

with Fred Russell

If you want a personal reply from Mr. Russell please include a self-addressed stamped envelope.

I have a 1942 Dodge truck. I tore the motor down, put in a new crankshaft and new piston rings and yet the engine still knocks. Can you tell me what's wrong? Marvin Chamberlain, La Feria, Texas.

The knock in your engine may be due to nothing else but warped valves. If the knock sounds like a ping, check to see if there are any rough spots in the cylinder head. Such spots could glow and pre-ignite the fuel.

What octane gas should I use in my 1946 Nash? It has a compression ratio of 7.1 to 1. G. P. Rauch.

It is not necessary to use gas of a certain octane rating to match compression ratio. You will get the best results by using the premium version of any of the standard brands.

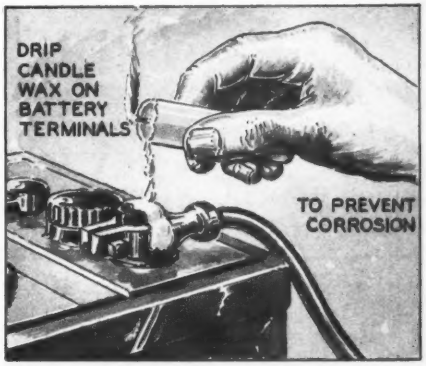
Are the "plugs" in the block of my automobile engine really expansion plugs to prevent damage due to freezing? Raymond Poffenberger, Great Lakes, Ill.

They are not expansion plugs, they are core plugs; part of the process in casting the engine block.

A friend of mine has a 1937 Plymouth. He had new rings put in but after 1500 miles it burns a quart of oil every 100 miles. He uses SAE 30 and sometimes 40 oil. He took it back to the mechanic and had the compression checked, which seems OK. The plugs look clean and the engine doesn't leak oil. The exhaust is clear unless the motor is suddenly gunned. When the motor is being used as a brake, it turns over as though compression were very weak. Where is the oil going to? C. W. Paice, Windsor, Ont., Can.

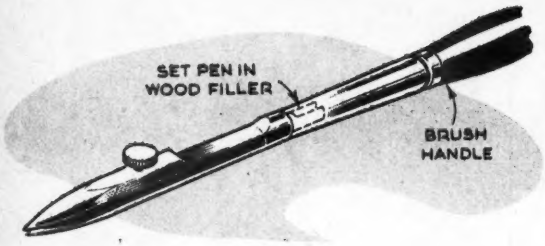
The oil your friend is using is a bit on the heavy side. A heavy oil does not lubricate as well as a light oil. It heats up the engine, thins out and burns off. I believe the oil is burning in the cylinders even though you do not notice this in smoke. Unquestionably compression is down. When you test the motor the compression gauge should read 140 pounds when the engine is turning 1000 revolutions per minute.

TOP: Many cars use wheel mounting studs with left hand threads on the left side of the car. It is a good plan to letter the inside of the hub caps as a reminder for which thread is which. BELOW: An easy way of preventing corrosion on battery terminals with the aid of a lighted candle.

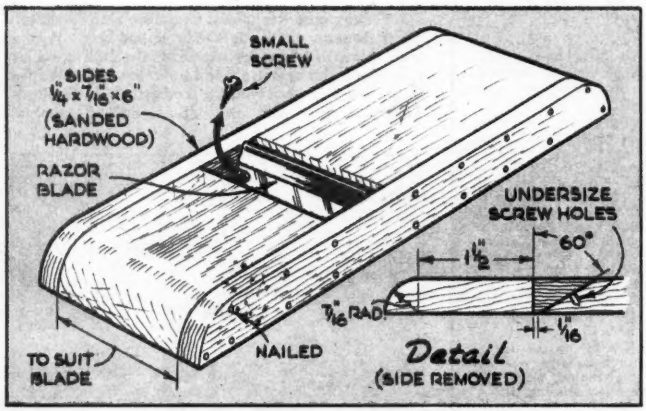


RIGHT: A faulty retreading job will usually show up after short use. It is a good idea to check the tread right after a hard run to see how the new rubber is holding on to the original shoe. BELOW: A frozen lock in the luggage compartment can be returned to action by heating it with a candle. You can free frozen door locks by heating key.

SHOP TIPS



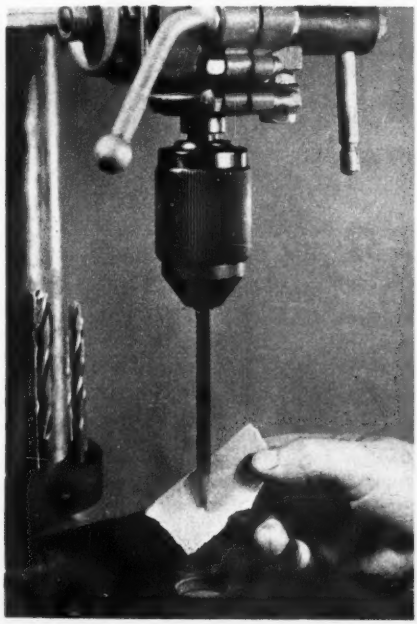
AN EXTRA ruling pen can be made by detaching the nib from the compass and inserting it into the handle of an old brush. Drill a hole in the handle and fill it with plastic wood. Remove the pen before the filler sets so that it can be transferred to the compass as needed.



THIS handy model-maker's plane uses old razor blades. Its length is about six inches but can be varied to suit if desired. If you limit it to fine cuts you'll wonder how you ever got along without it.

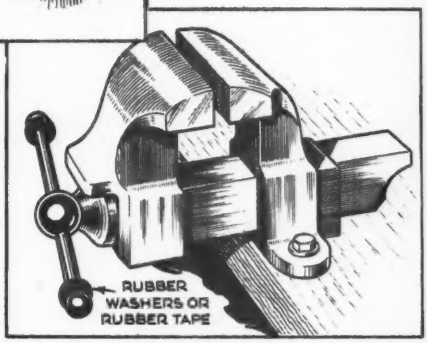
LEFT: Garden tools will last longer, and will always be found when needed, if they are stored on racks or hung from nails on the garage walls. The space between the wall studs forms an ideal place for such storage. Here is how the wall of one MI editor's garage looks.

WORN-OUT floor brushes can still be used around the shop by cutting out the least worn part and inserting a new handle. They make ideal whisk brooms around the lathe and the workbench.



HAVE YOU ever scurried around the shop trying to find a sharp pencil? Sharpen them on the drill press with a bit of sandpaper as shown.

THE CUPPED push plate for the jaws of one type of drill press chuck may become so battered they will not grip. A wheel from a discarded watch can be used for an emergency repair by punching out the center and placing it on the chuck. Teeth may have to be filed to permit plate to push jaws out far enough into cone to grip fine drills.



BARKED KNUCKLES and blood blister caused by falling vise handles can be eliminated by covering the ends of the handles with rubber, as above.

THE CONTROL SWITCH of some lathes is mounted on a bracket extending from the rear of the bed. It is a definite hazard to grope for the switch while keeping an eye on the work. After an accident one worker moved the switch to the edge of the table. Now it can be turned off with the knee if both hands are busy.

UTILITY GARDEN TRACTOR

Build this low-cost machine from used car parts and ride while you work. Power is a small air-cooled gas engine.

BY HI SIBLEY

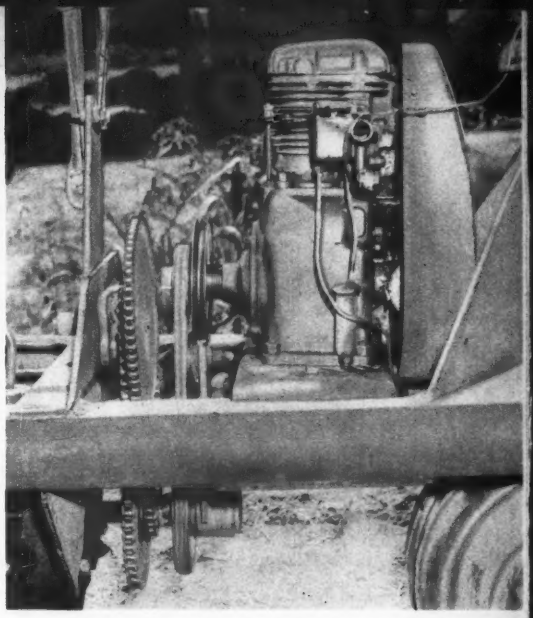
CONSTRUCTED along the same lines as its larger brothers, this compact tractor is the ideal machine for the man who cultivates several acres or owns a small subsistence farm. Powered by a 1½ horse, air-cooled gasoline engine and weighing about 600 pounds, the tractor has a wheel base of only 54 inches and a tread of 40 inches. This means that it will straddle one furrow in a garden laid out with conventional rows spaced 20 inches apart. Because of the very low gear reduction, the machine will pull a double plow, scraper, cultivator or rake using an interchangeable implement hitch.

All of the parts of the original model were taken from used cars, with the exception of the chain and sprocket unit which was removed from an Army balloon winch obtained at a Surplus Goods Depot. A 1½ hp, 1,800 rpm. Sattley engine was used but any similar engine such as a Briggs and Stratton will work equally well. The transmission is made by the Muncie Gear Works, Muncie, Indiana, and the 7 by 28 inch rear wheels can be obtained from any make of light truck. The sources of the remaining auto parts used are all shown on the detailed drawings.

Most of the assembly is by welding and the first operation is to make the chassis from angle iron, mitered and welded at the corners. A 1½ in. pipe is welded at a slight angle to the front end and functions as the steering post housing. To brace it, two triangular pieces are cut diagonally from a 12 in. square of boiler plate and welded in place. The steering post and assembly are then made and installed in place, following the drawing for the details and using the parts specified. The next operation is to cut the plates that carry the reduction drive bearings and transmission. Before these are welded in place at the top and bottom of the chassis as shown, holes should be cut for the bearings and a bronze sleeve welded in place to support

the forward end of the jackshaft. Moving to the rear of the chassis, the angle iron frame is boxed in on both sides as shown in the small inset drawing and holes drilled in the right locations for bolting the axle mountings in place. The step shown at the rear of the chassis is welded in place to support the implement hitch. Two braces of angle iron welded on either side make it rigid. Following this, the mountings for the idler and cultivator levers and operating linkage are made and welded in place, together with the support for the seat. The mountings for the rear axle are then cut out and welded on the cut-down axle. With the chassis completed, the next step is to bolt the rear axle in place and mount the wheels. The front ones should be set at an angle so they will run easily in the furrow. The engihe is then installed and bolted in place on the chassis.

The details and arrangement of the reduction gear drive are shown in the photo



Side view of engine and reduction drive installations. Flanges of lower Vee pulley and small sprocket are welded together.

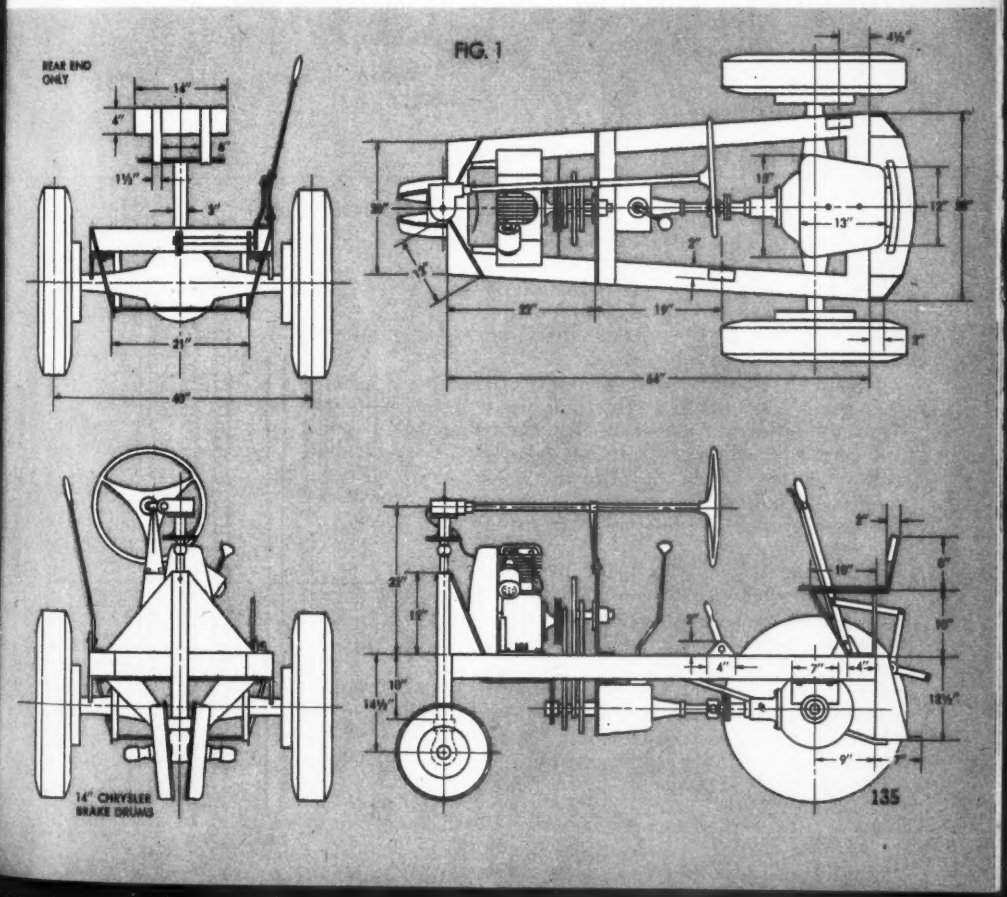
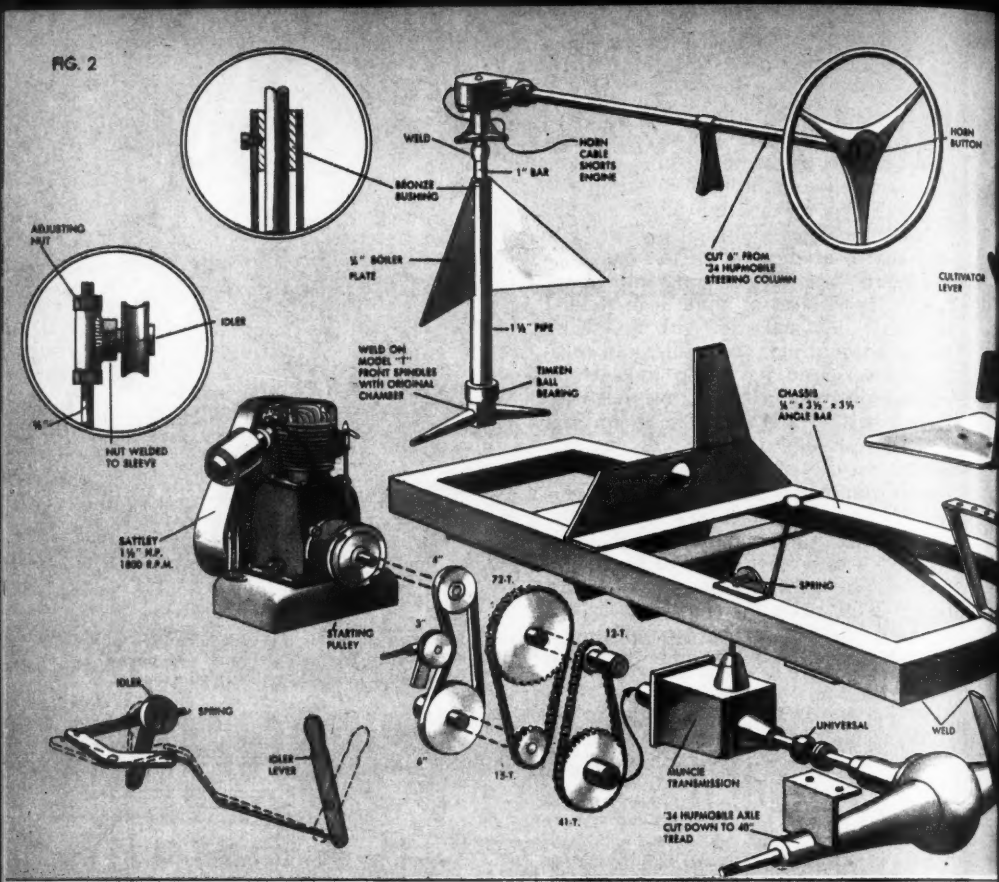


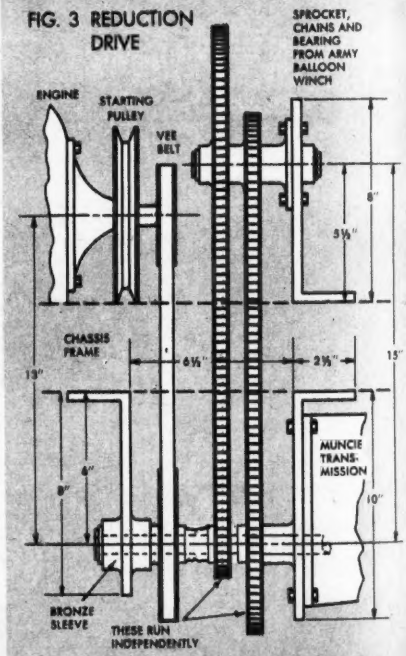
FIG. 2

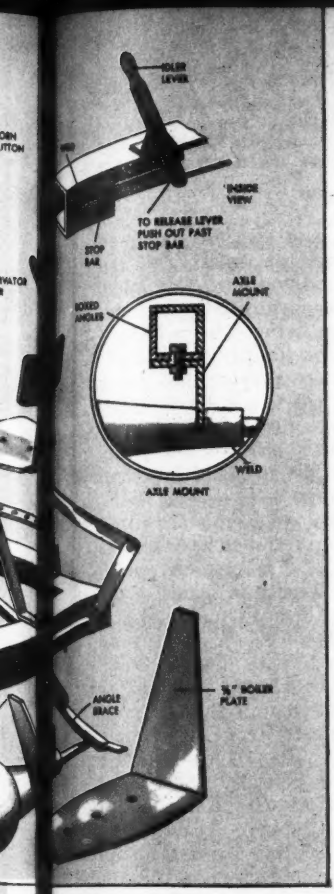


and in Fig. 3. This uses a 2 to 3 reduction from the engine to the jackshaft via a belt drive, followed by a 15 to 72 reduction by means of a chain and sprockets and with a final reduction of 12 to 41 by the same means to the transmission. For the 1½ hp. engine, a reduction of 50 to 1 will give the best results. If a larger engine is used, the reduction should be in proportion. After the chain and sprocket drive is completely installed, the Muncie transmission is bolted in place and a drive shaft and universal joint used to couple it to the rear axle.

The idler assembly is made up next and installed in place together with the linkage and lever. In operation, the motor is started and runs free until the idler lever is pushed forward. This presses the pulley against the belt, tightening it and transmitting power to the rear axle. The idler is held against the belt by a strong tension spring while a stop welded inside

FIG. 3 REDUCTION DRIVE





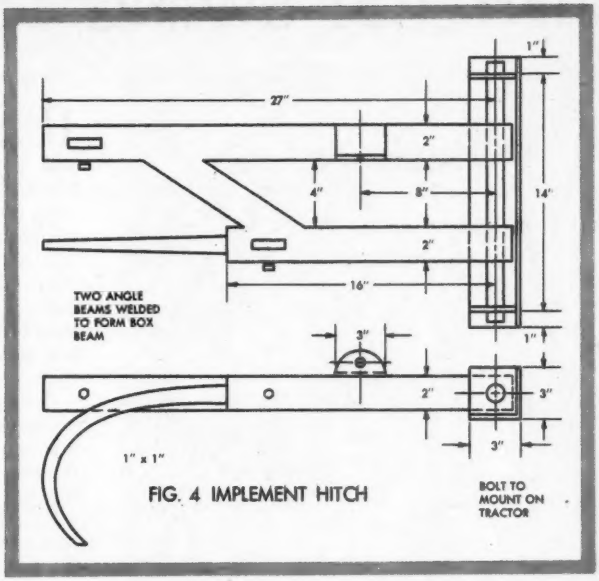
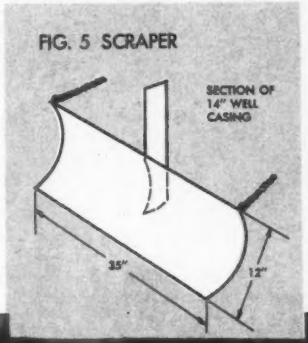


FIG. 4 IMPLEMENT HITCH

Plows, rakes, cultivators or scrapers shown at the right can be used with the hitch.

Below: Attachment bolted to tractor step. Note links and arms for raising implements.



the frame holds the lever in place. To disengage the engine, a spring on the pivot bolt of the lever permits it to be pushed out past the stop. Pressing the horn button will short the engine and stop it completely.

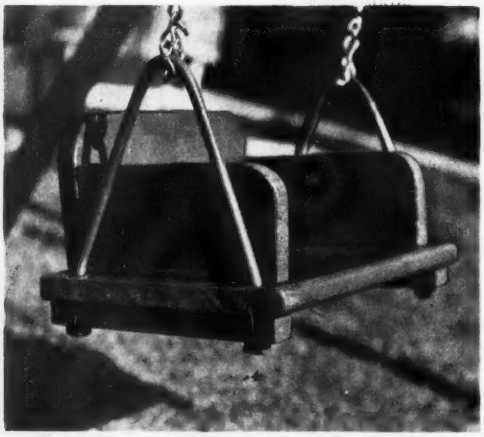
The long cultivator lever which raises and lowers the implement hitch by means of links and rocker arms should be made and installed, following the drawing. The seat is made last by welding parts cut from scraps of boiler plate.

The implement hitch shown in the photo and detailed in Fig. 4 will take rakes, plows, cultivators or scraps. It consists of two parallel box beams made by welding angle iron pieces together, with slots cut in them to hold the interchangeable implements. The beams are pivoted on a bar set in a frame bolted to the rear step of the tractor. Scrapers to use with the hitch can be made from sections of well casings, as shown in Fig. 5.

TINY TOT SWING

BY HAROLD JACKSON

Seat is made of 1 in. stock; it measures 10 in. wide and 14 in. long; back is 12 in. long and 6 in. wide.



HERE is a specially designed swing for small children who are too young to play safely in regular playground equipment or in a tree swing. They will have a lot of fun with this sturdy stand. Furthermore they cannot swing high enough to get hurt if they fall. The complete swing can be made in the home workshop in a few hours, at a cost of less than three dollars.

Two A-shaped ends are made as shown in the sketch. The legs are made of 2 x 2 in. material 6 ft. long. The upper ends of the legs are cut so as to make a square slot at the top when the legs are spread 5 ft. apart at the bottom. This is shown at A. The upper tie board is applied as shown using two bolts in one leg and one bolt in the other. This is to provide a hinge joint at this point. Carriage bolts, 2½x5/16 in., are used for fastening. The long tie board is 1x3 in. and 36 in. long. It is secured to the legs at the center with a bolt at each end.

The top rail is made of 2x4 in. material and is 48 in. long. Eight 1x3 in. blocks are nailed to the ends of this piece and are spaced as shown at A so that the top rail will fit snugly into the slot at the top of the legs. This is a set-in joint and is not fastened. The strap iron braces are 1 in. wide, ¼ in. thick and 20 in. long. They are bolted in place with 2x5/16 in. carriage bolts. The two eyebolts in the top rail are spaced 16 in. apart.

The frame is quickly knocked down for winter storage by removing one bolt from each of the braces. The top rail is then lifted out. The side bolts are also removed which allows the frame to be folded up as indicated by the dotted lines.

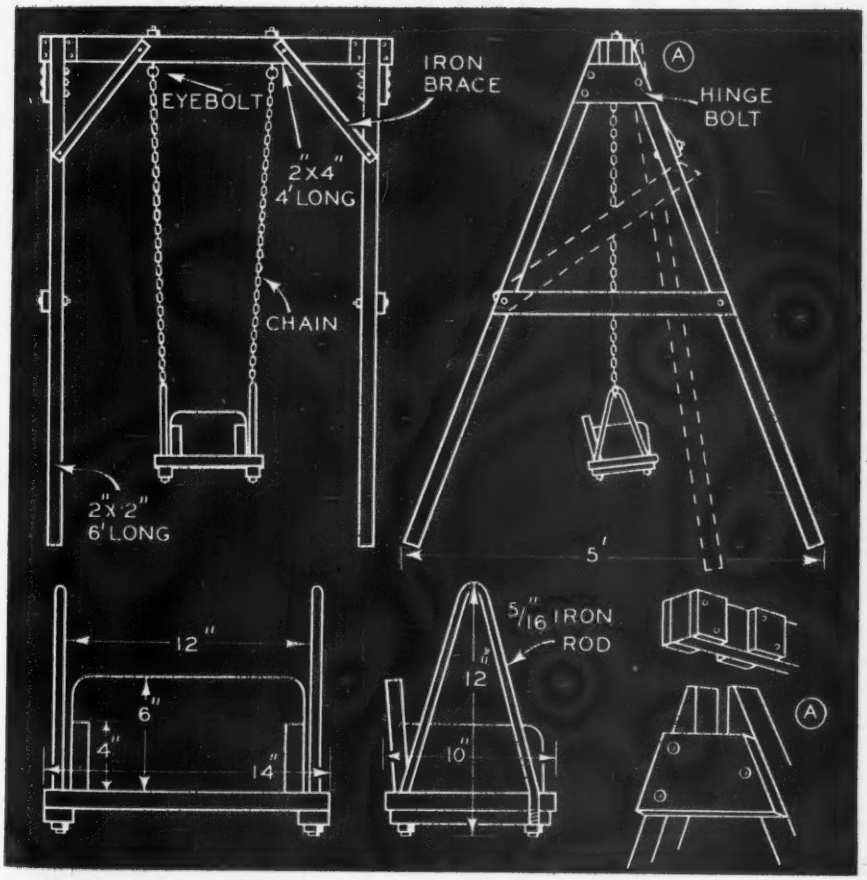
Detail of the seat is shown at the bottom of the drawing. Strips

A back yard swing safe enough for a one-year-old built at a cost of less than three dollars.

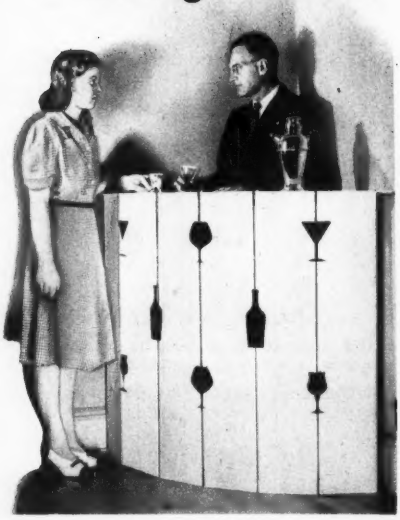
1x2 in. and 9½ in. long are placed under the seat board near the ends. The seat hangers are made of two 5/16 in. iron rods, 26 in. long. The rods are threaded with a 5/16x18 die at each end, bent as shown and attached to the ends of the seat as indicated with 5/16 in. nuts on the bottom.

Two 5 ft. pieces of galvanized iron chain are used to support the seat. A foot or so is run through the eyebolts and doubled back to allow for height adjustment. A heavy wire hook is attached to the chain for this purpose. All parts of the swing should be carefully sanded to eliminate splinters.

Note how two arms of the A form a slot for the cross piece. Swing can be easily dismantled for winter storage.



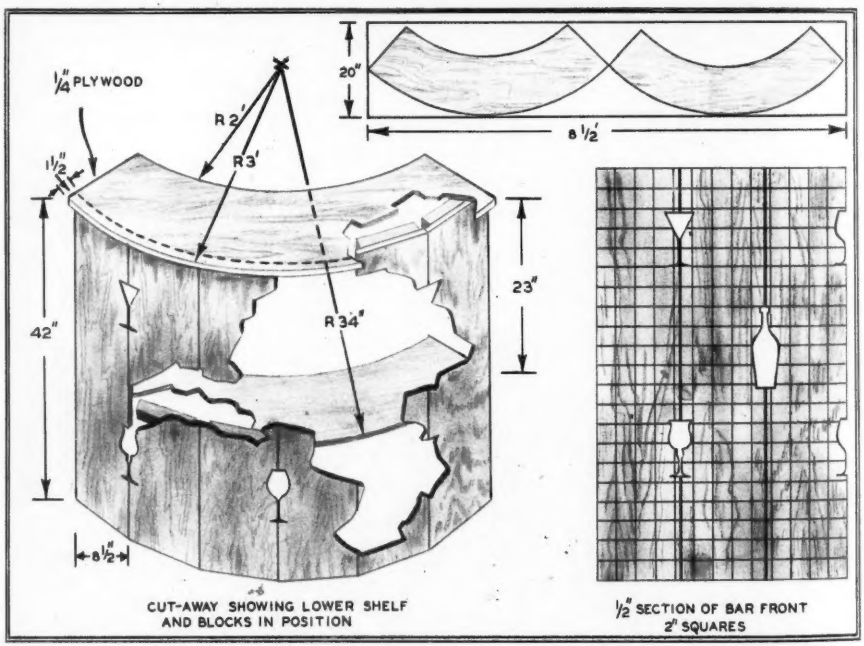
Corner "filling station"



"What'll you have?" The enticing bottles and decanters are cut-outs in the wood. Right: Assembling bar with blocks and screws.

THE problem of where to put the bar in the cellar and still leave plenty of room for the ping-pong table is solved by building a circular bar in a convenient corner.

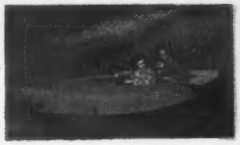
This one consists of two quarter-circle shelves secured to six vertical members, all eight parts made of ¼ in. plywood fastened together by means of screws and wooden blocks. The ends of the top shelf extend about 1½ in. beyond the vertical members. This permits the sides to clear the baseboards, while the top shelf itself fits snugly against both walls.



Build with MI PLANS

BONNIE, 18' V-bottom auxiliary sloop. Plywood construction, seaworthy. No. 944, $3.00, (with full-sized patterns, $7.00).

MALLARD, 14' plywood hunting or fishing boat. Optional rowing or outboard hulls. No. B-143, $1.00.



TESTED BOATS

Scale Blueprints

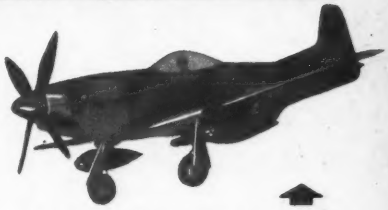
SCRAM III, 16' inboard designed to take a model B Ford marine conversion engine. Simple plywood construction throughout. No. 936, $1.50.

FLYER, 12' outboard utility. Uses 1 to 10 h.p. engine, speeds up to 20 mph. No. B-142, $2.00.

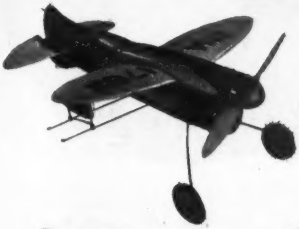
TESTED MODELS

Full Size Plans

BOUNCIE, 32-in. speedboat. Easy to build, takes any engine. Plans also contain instructions. No. 362, 50c.



P-51H MUSTANG, 32-in. control-line job features removable landing gear, take-off dolly. Realistic, easy to build and fly. Plans, instructions, No. 364, 50c.



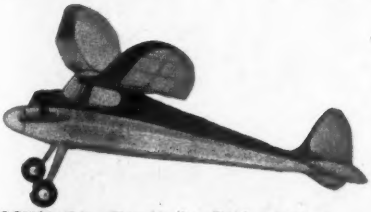
DOODLEBUG, 95 mph 16-in. control-line speedster-trainer ideal for either beginner or expert. Takes any A or B engine. All around performance. Plans contain instructions. No. 365, 50c.

SKYSEDAN, 36-in. super-scale control-line model of the new Piper private plane. Power with any class engine. Plans contain instructions. No. 370, 50c. SEE YOUR HOBBY SHOP FIRST!

NAVION, 36-in. scale control-line model of North American's new lightplane. Tricycle gear prevents broken propellers. Simple construction. Plans contain instructions. No. 369, 50c.

PYLON BUSTER No. 373, 50c

FULL SIZE plans of the model appearing on pages 124-129 are available at your local hobby shop. If your dealer cannot supply you fill in the coupon below and also attach the name of your dealer. SEE YOUR HOBBY SHOP FIRST!



SNOOTIE, 40-in. Class A free-flight contest job designed for the Arden .099 power plant. Complete plans and instructions. No. 370, 50c.

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The plans listed on this page are only a few of the many MI publishes. Send a 3c stamp for the new 100 project MI PLAN BOOKLET.

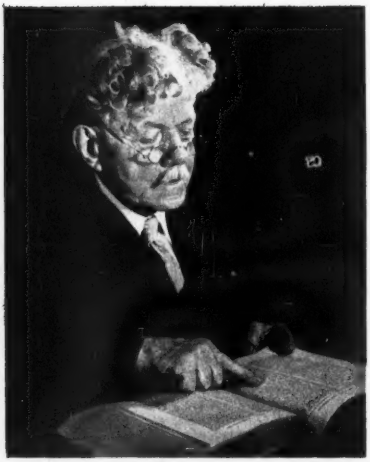
1st Prize.....Seein' Things
$10.00 to Austin Phelps of Omaha, Neb. Taken with a view camera, flash at f-22.

Photo Contest

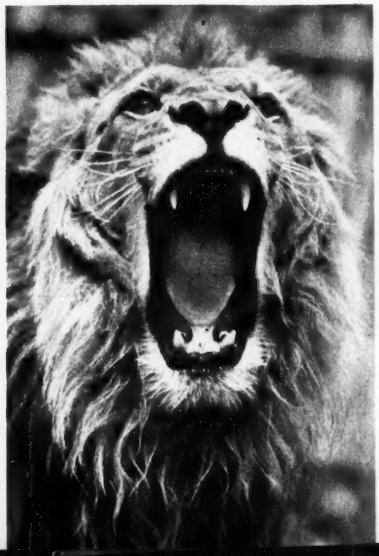
MONTHLY PHOTO CONTEST RULES

Please put your name, address and picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Photo Contest Editor, MECHANIX ILLUSTRATED, 347 Madison Ave., New York 17, N. Y.

$5.00 Award.....Just Sherry
Photographed by Barth Costanzo of Philadelphia, Pa. Speed Graphic shot at night.



$5.00 Award.....The Scholar
K. P. Rounsler of Harrisburg, Pa., used a Voightlander camera and Panatomic X film.



$5.00 Award (right).....Lunch
Captured by James Edwin Hogg, Alhambra, Cal. How about some details, Mr. Hogg?

Handy Power Pack

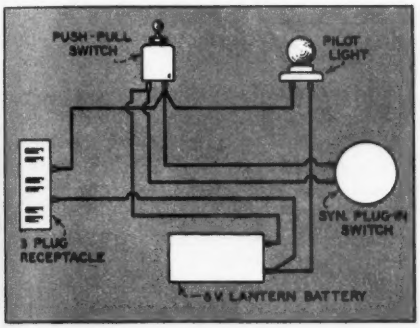
A portable power source that will fire four flash bulbs at fifty feet.

BY FREDERIC STEBBINS

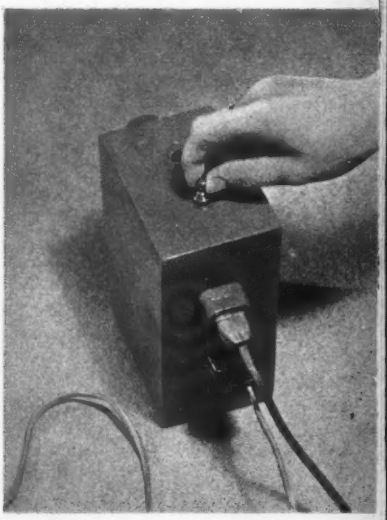
HAVING occasion to make portraits in farmhouses not yet blessed with electricity, and not being especially pleased with the flat results of my flashgun, I was stumped until I constructed this Power Pack.

What I wanted was a small box that would have an adequate power source, would last a reasonable time, and be able to flash 3 or 4 lights at a distance up to 50 feet. For power I decided on a 6-volt lantern battery. A manual switch, for open and shut flash, a pilot light to guard against burned fingers if the bulb were accidentally inserted while the power was on, plus a receptacle for my camera synchronizer and three outlets for flash constituted the main requirements. Outside dimensions of the box, using 3/8 in. plywood are 5½x7x3¾ in. Since the box was designed to stand upright on one end, the battery was placed on its side at the bottom with a dividing board directly above it to hold it snugly in place.

The pilot light consists of a 6-volt lamp and socket, placed as shown in the photo below, with a red celluloid cover.



A view of the interior showing position of the pilot light in relation to outlets and battery. RIGHT: The Power Pack in operation; photographer is using manual switch for open and shut flash.



Your Favorite Photo *Anywhere*

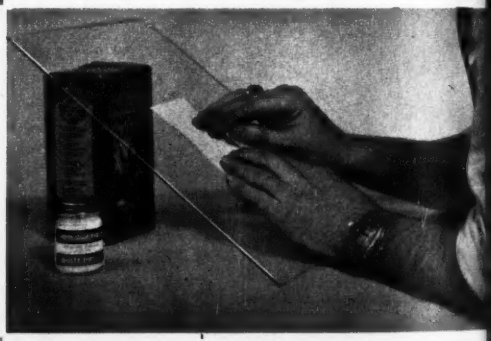
BY KEN MURRAY

On glass or wood or anything else you may want to decorate.

PHOTOGRAPHS can be transferred easily to all sorts of materials such as porcelain, celluloid, plastics, metal, or even eggshells. Two methods may be used; the first does not require any knowledge of photography at all—if there is anyone who hasn't yet taken up that hobby!

First method. Any snapshot or photo may be used. The surface of the print is first coated with clear lacquer. If the lacquer is thin, two coatings may be re-

The first step is to coat the print with clear lacquer or transparent finger nail polish. It is best to use a photo which has been printed on matte rather than glossy paper.



The third step is to paste the photograph face down on a sheet of glass using ordinary library paste. This is in preparation for the next step which removes the balance of paper still adhering to the picture.

After the lacquer has dried the print is soaked in water for about twenty minutes to soften the backing paper which is then removed with a piece of sandpaper as shown below.

quired. Nail polish may also be used.

When the lacquer is dry, soak the print in water for twenty minutes. Hold it in one hand and gently brush one corner of the backing paper with a bit of sandpaper. Most of the paper can be loosened this way without injuring the emulsion, and it can then be pulled away.

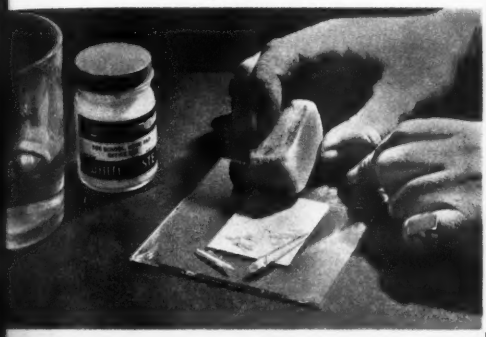
Blot all excess moisture from the picture and, using ordinary library paste, attach it face down on a sheet of clean glass and allow to dry. Moisten what backing paper is left and gently rub it with a gum eraser. The remainder of the paper can be rolled from the picture, leaving the image supported by the film of dry lacquer.

Loosen it from the glass by immersing it in plain water and allow it to dry. Then carefully attach it with a thin coat of spar varnish to the surface you have selected.

Second method. Transparencies can also be obtained by printing the selected negative, by contact or enlarging, onto a slow lantern slide plate.

After the plate has been fixed and washed, you will have a positive transparency. Wipe off the surplus moisture carefully, then soak it for ten minutes in a solution of 5 oz. of potassium carbonate in 2 oz. of water.

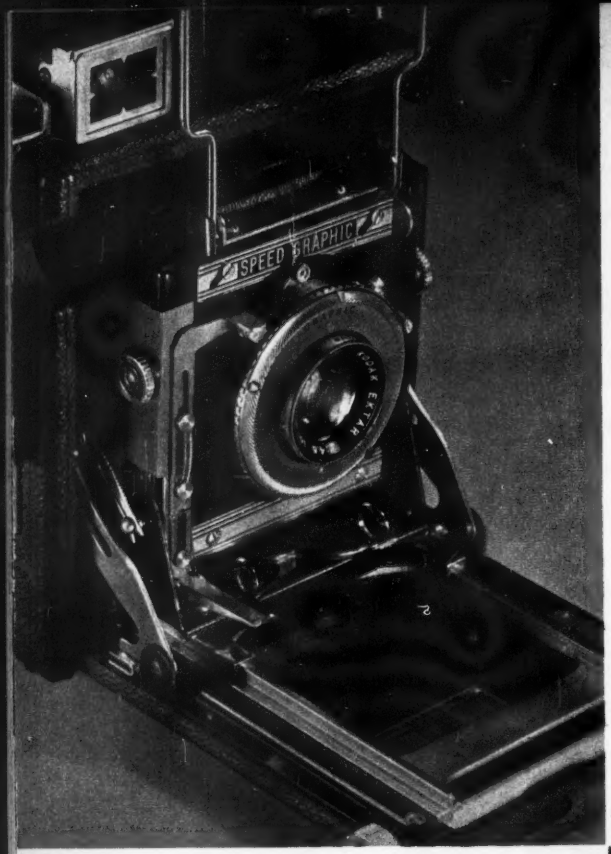
Wipe the plate with a soft cloth and put it aside for a few hours, after which you can strip the emulsion from the glass. The best method of doing this is to make a cut through the emulsion around the edge of the plate, with a sharp knife, as shown in the photo below.



Fourth step: Moisten the remainder of the backing paper and rub it off with an artist's gum eraser. The paper will roll off as pictured above.

A step in the second method: Cutting through the emulsion at the edge of the lantern slide plate so that the image may be stripped from the glass.

After image has been loosened from glass by immersion in water it is attached to desired object by means of a thin coat of spar varnish. Press out all air bubbles carefully.



Note how the shutter release looks like an integral part of the camera.

Speed Graphic shutter release

BY FRANK McCARTY

A "cable release" that's always where it should be—on the camera.

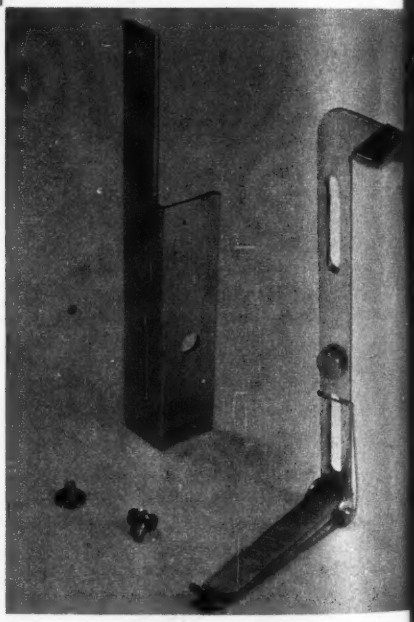
ON CAMERAS featuring a front focusing arrangement, the time lapse between focusing and tripping the shutter can be eliminated with this practical shutter release. With this extension, the thumb need only be moved from the focusing knob to depress the lever which trips the shutter.

The dimensions given are for a Miniature Speed Graphic but slight alterations will adapt it to any camera. A pattern of the release arm laid over a simple drawing of your camera front will indicate the necessary changes.

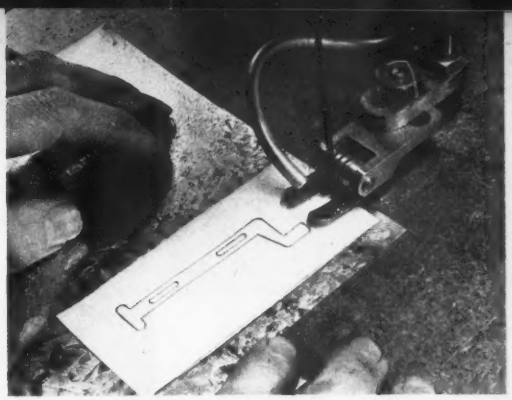
Trace the design on 1/8 in. graph paper, paste to a sheet of No. 18-gauge metal and cut the base, sliding arm and thumb lever.

The dotted lines indicate where each part is to be bent. The thumb lever is formed as a channel and then filed to shape. It is hinged to fold up against a sliding arm. A spring around the hinge pin keeps it erect when the camera is open. File the notch in the arm until the thumb lever is at right angles to it. The hole, through which the small end of the hinge pin fits, is countersunk so that the pin can be peened to hold it in place. This

How the sliding release arm looks before being riveted to the base.



Paste pattern to metal and cut with jig saw using metal cutting blade.



method is also used for setting the other rivets.

The two, three-step rivets are turned from a 3/16 in. mild steel rod. They are identical, with the exception of the upper one which is nicked for the return spring.

After assembly the unit can be attached to the camera by removing the knurled nut of the rising front mechanism and fitting the hole in the base over the protruding bolt.

The shutter release need not be removed when the camera is closed; it does not interfere with any other parts of the camera.

A finishing touch can be put on the completed shutter release by rubbing it down with some steel wool to give it a sand-blasted effect.

All set and ready to go. There is no fumbling with this type of release.

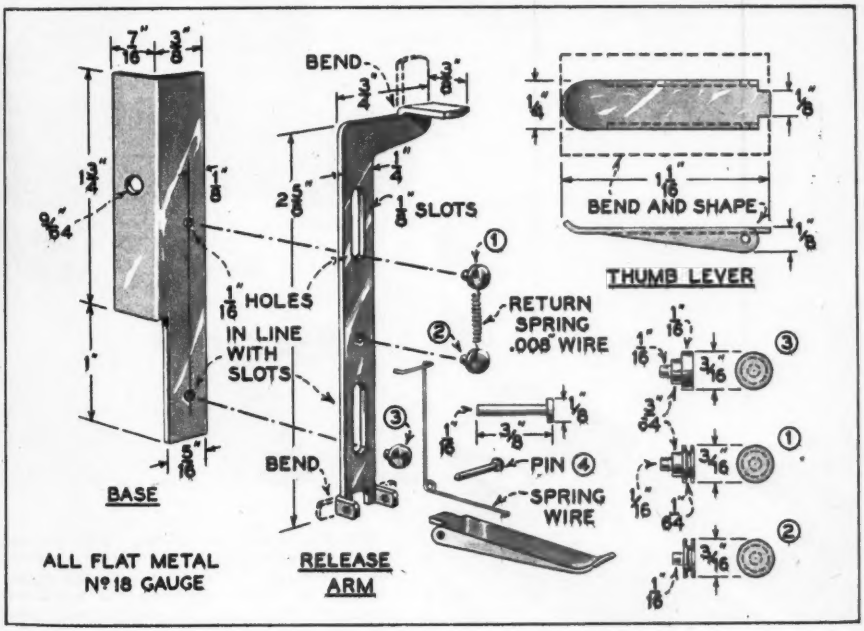
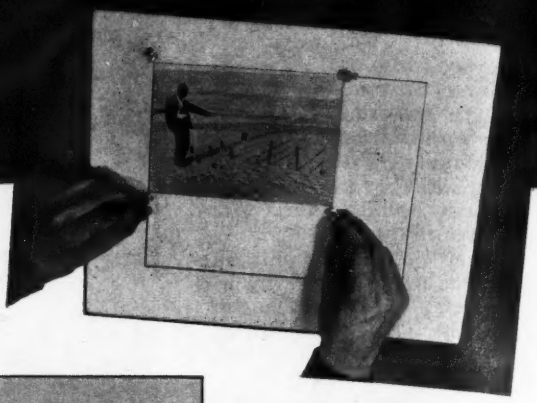
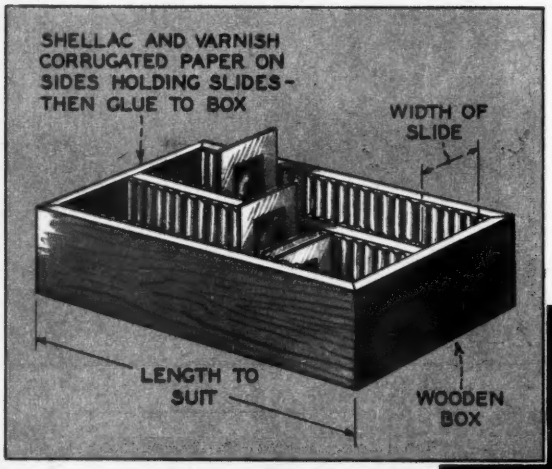


PHOTO SHORTS

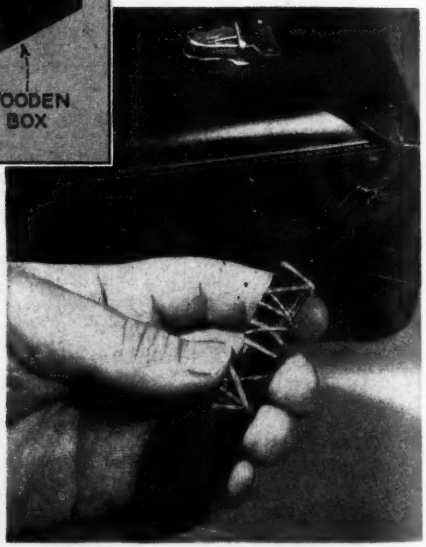


RIGHT: Enlargements without white margins can be made by pinning the paper at each corner with push pins, to a piece of white painted wood. Slant the pins away from the paper so they will cause the least shadow on the enlargement.



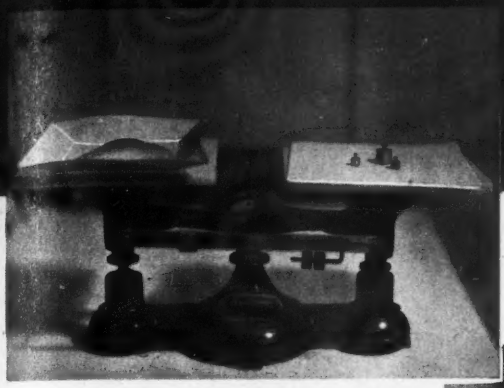
LEFT: A wooden box lined with corrugated cardboard makes a fine container for slides. Glue cardboard in place and shellac corrugations for extra stiffness.

BELOW: Your camera case shoulder strap will not demurely glide off your shoulder if you twist a couple of elastic bands around the strap as illustrated.

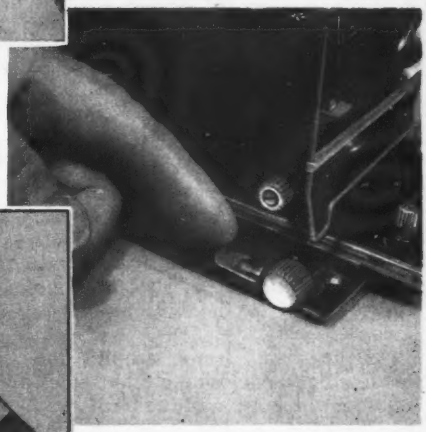


LEFT: Most electric print dryers handle but one batch of prints at a time. Double this capacity by covering the tin with a blotter and adding another tin before applying the hold-down canvas. Drying time is affected very little.

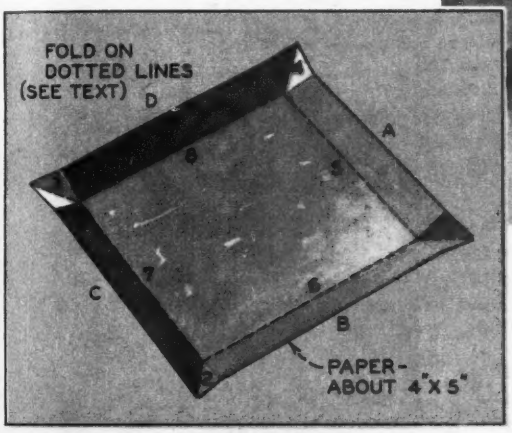
MI welcomes contributions such as these. If usable they are paid for promptly.

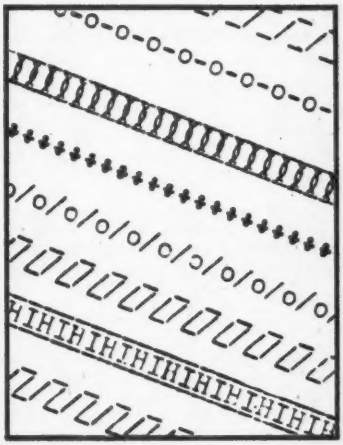


BELOW: A temporary repair to a worn focusing catch is to slip a small piece of brass under the focusing knob so that a turned up edge of the strip will engage the milled part of the focusing knob.



A SIMPLE PAPER TRAY can be made from a 4x5 in. sheet of paper. Crease corners 1, 2, 3 and 4 about an inch toward the center. Then make creases 6, 7, 8 and 9 an inch from each edge.





TYPEWRITTEN BORDERS. Copy desired pattern and use as a negative for double printing. Paper negative, made by typing on thin paper and then printing on contact paper, can also be used, see left.

TRIPOD ADAPTER

Ever gnash your teeth because your camera has no tripod socket?

INEXPENSIVE folding cameras without tripod sockets can be easily adapted for tripod use with this device.

The adapter consists of a 1/4 x 20 nut set in the center of a block of wood. The wood is enclosed by a metal frame which clamps to the bottom of the camera.

Fit the metal frame around the wooden block, enclosing it on all sides. A hole in the bottom of the frame permits the tripod to engage the nut. The frame is made from one piece of metal. It houses the wooden block and also clamps the camera bed. Two holes at the end of each section are for a clamping bolt. To use the adapter, place it over the camera bed, tighten the clamp and insert the tripod screw into the nut.

The finished adapter. Bolt and wing nut serve to tighten adapter around the camera bed.

THE QUESTION BOX
by Robert Brightman

Where can I get back issues of GOOD PHOTOGRAPHY and PHOTOGRAPHY HANDBOOK? Albert Adamich, Cleveland, O.

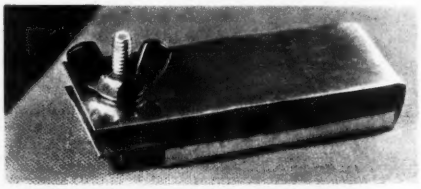
Some back issues are out of print. Those that are available can be procured from our home office at Greenwich, Conn.

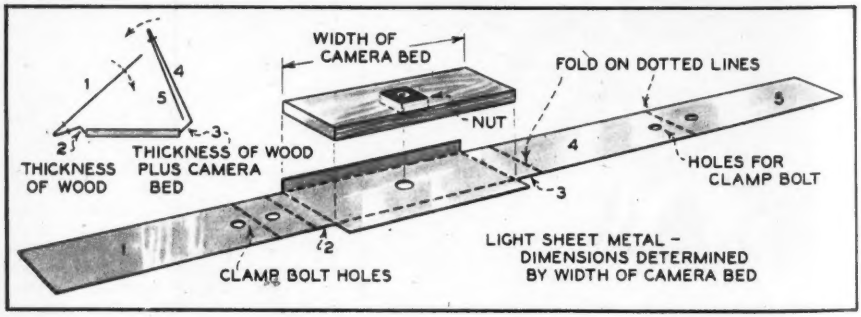
What are the shutter speeds on my Falcon Minette and Baby Brownie Special cameras? John Strole, Weehawken, N. J.

Both have a fixed shutter speed of approximately 1/30 of a second.

How can I take a flash shot with a camera that is not made for flash attachment? Ronald Steinberg, Greenwich, Conn.

You can take an open and shut flash picture with your camera. Place the camera on a firm support, open the shutter to "time," fire the flash bulb and then close the camera. The room in which you are taking the picture should be rather dark so that there will be no secondary image.

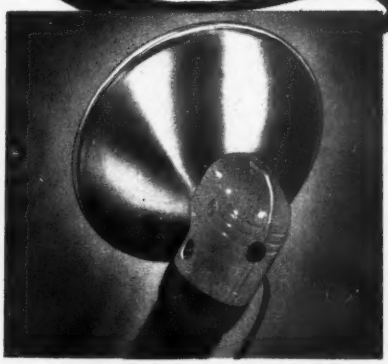




Brownie Reflex—for good snapshots night or day · · · indoors or out

Snapshots anywhere, anytime . . . in sun or shadows . . . inside or at night. Attach an accessory Flasholder to a Brownie Reflex, Synchro Model—insert a bulb—and you're ready to go. One button to push for both shutter and flash. Big brilliant finder previews your picture in actual size before you snap it.

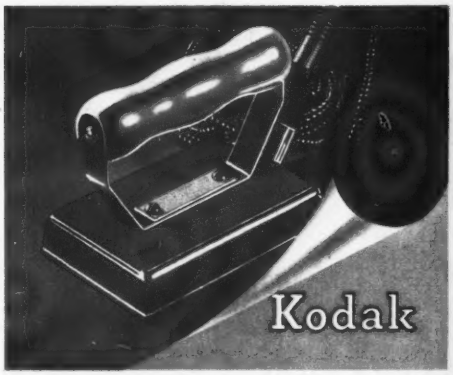
Kodak Flasholder teams with new shutter on Kodaks, to insure accurate synchronization with the flash peak of the lamp you use . . . "fast" Class F or "slow" Class M. Light and strong, equipped with anodized aluminum reflector and button-operated ejector. Socket accepts either Class F or Class M midget bulbs.



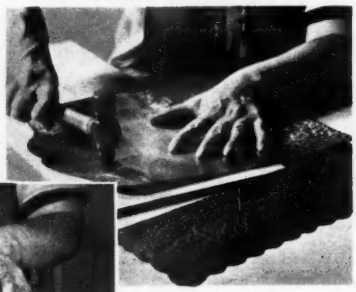
Ejector button on Kodak Flasholder saves you finger burns

Mount your valuable prints this safe and convenient way . . .

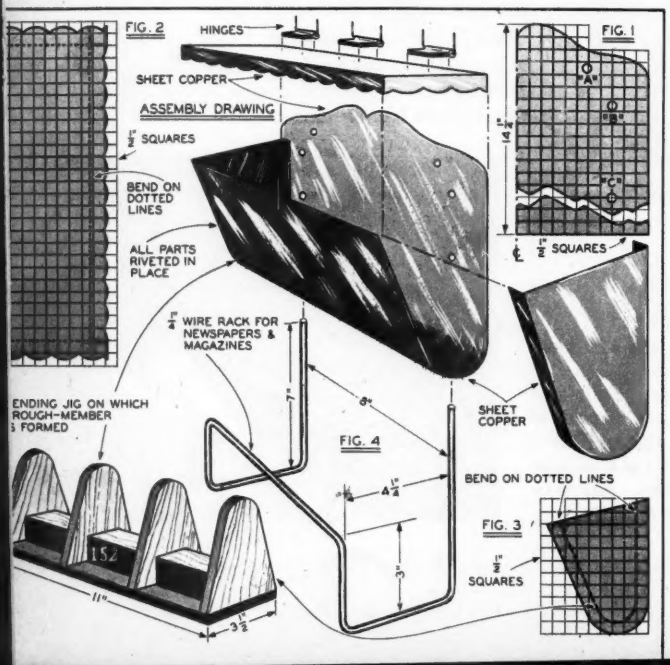
Here's a way to prevent curling and buckling of prints mounted in albums. Use Kodak Thermount Tissue and Kodak Thermount Iron. You fasten the entire back of print to the page—securely, evenly. This method is recommended for Kodachrome and Kodacolor as well as black-and-white prints . . . EASTMAN KODAK COMPANY, ROCHESTER 4, N. Y.



Right: Giving parts a hammered finish. Note that finish at curved end is on other side of copper sheet. Box is burnished with steel wool and lacquered to avoid tarnish.



Bending trough-member around the jig. A wood block and hammer are used to shape copper.



HAMMERED COPPER MAIL BOX

THE postman will never have to ring twice, in fact he won't have to ring at all—if you hang this attractive letter box at your front door.

To start the construction, copy the patterns for the various parts on paper ruled in 1/2 in. squares. Use the cut-out patterns to mark the parts on soft roofing copper and then cut them to shape. Before bending the pieces, give them a hammered effect as shown in the photo and then drill the holes.

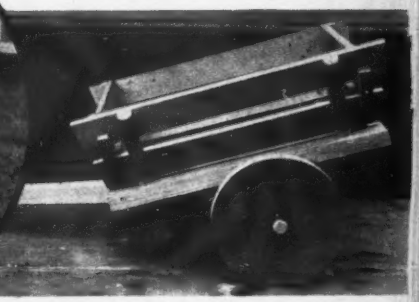
The next step is to make the wooden bending jig, following the drawing for size and details. This is used to bend the center piece to shape. For the ends and cover, clamp each piece between two boards cut to the size indicated by the dotted lines on the drawings and bend over the flanges by hammering. After the parts are drilled and riveted together, make the hinges by cutting 1 by 1 1/2 in. pieces from scrap. Bend these in half over a U-shaped piece of wire, then drill and rivet the hinges to the lid. The wires are inserted through holes drilled in the back and clinched.

The wire magazine rack should be bent to shape, inserted in holes drilled in the bottom and riveted to the back.

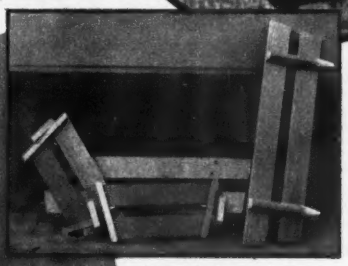
—*Bertram Brownold.*

Youngster's PLAY CART

Above: The most interesting part of the job, assembly of the cart.



Close-up of finished cart. Paint the wheels green or yellow to contrast with the body.



The photograph above shows the completed ends and the sides.

HERE are complete details for making an interesting little cart just like the one that the writer made for his neighbor's youngster. Richard, the recipient, is pictured in the circle just after the cart was given to him.

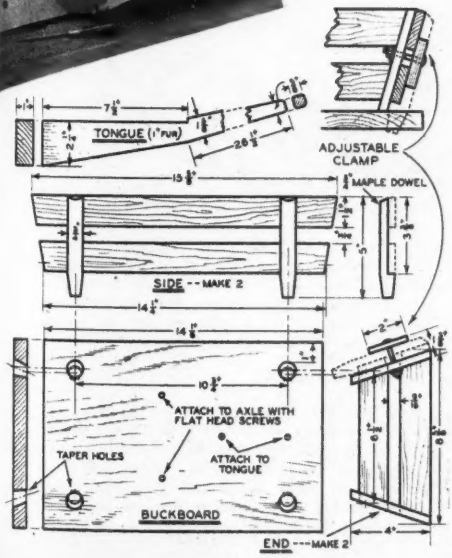
It is a very simple piece to make and a good deal sturdier than some of the flimsy toys sold today. All of the work may be done with hand tools; power tools will expedite the work if they are available.

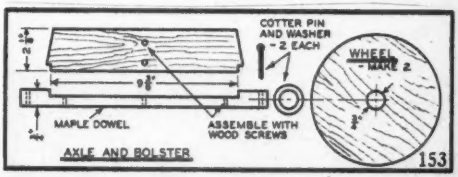
The wheels are sawed out on a band saw, or a coping saw. After cutting them as evenly as possible, they should be sanded smooth. Drill ¾ in. holes in the center for the axle.

The axle is a length of ¾ in. dowel cut as indicated. The bolster is made of ¾ in. wood, and is attached to the axle with round head wood screws.

Saw the tongue from a piece of fir and attach it to the bolster with flat head wood screws. The buckboard is made of ¾ in. white pine with ⅝ in. holes, drilled at a slant for the sideboard posts. These are tapered to prevent the similarly tapered posts from passing through. The entire chassis is painted a bright red, with the wheels a contrasting green or yellow.

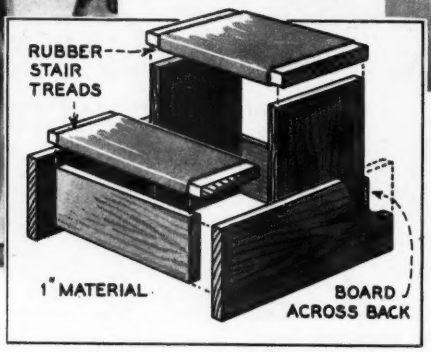
—Dick Hutchinson.



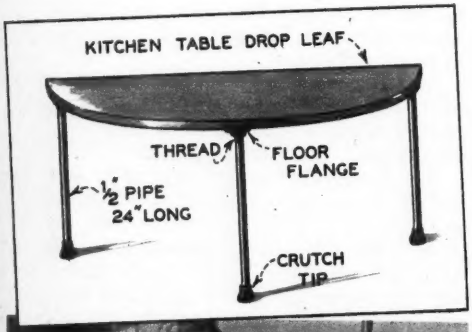


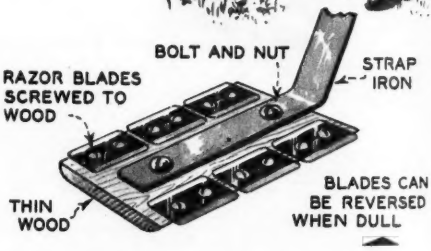
HOME AIDS

DON'T SPILL THE SALT. When packing small shakers in lunch boxes, you can avoid spilling the salt or pepper by pasting strips of Scotch tape across the tops. The strips can be removed in a jiffy and replaced frequently.

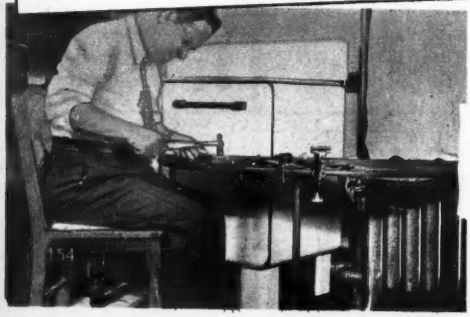


A SAFETY STEP FOR JUNIOR that will help children make the most of their opportunities can be made from wood scraps, following the details in the drawing. The big feature of this step is the use of rubber stair treads to avoid any possibility of the small fry slipping when the step becomes wet. Apart from this safety angle, the unit also has an educational value in teaching the younger generation many tasks.

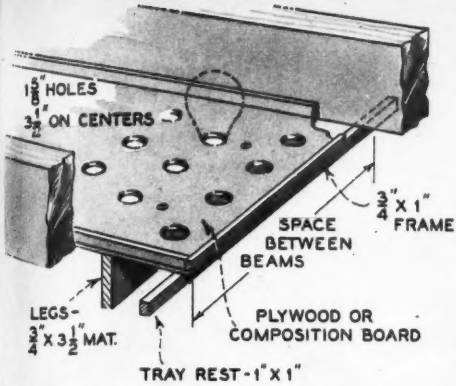


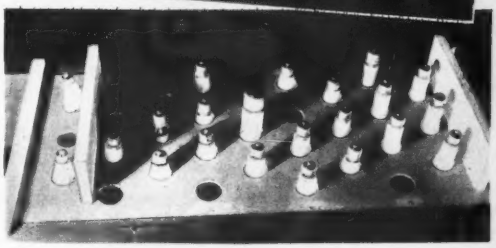


AN EFFICIENT WEED CUTTER can be made by screwing your old razor blades to a wooden block and adding a strap iron handle. By reversing the edges of the blades, you can get a new cutting edge. When it becomes dull, the blades can be quickly and easily replaced with new ones.

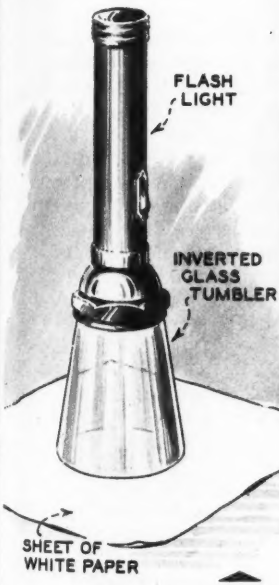


A PORTABLE WORKBENCH for those on-the-spot household repair jobs is easily assembled by attaching 3 floor flanges and short lengths of pipe to the underside of a drop leaf taken from an old table. The workbench can be taken apart quickly and stored in the nearest closet.

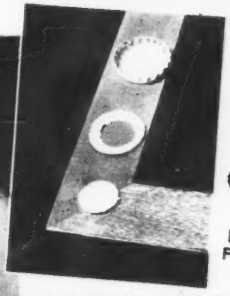




STORAGE TRAY FOR LIGHT BULBS. If you've wondered where to store your spare electric light and flash bulbs, why not use the space between your cellar joists? The handy tray shown can be made to fit any space and is easily removed for use. For Mogul base bulbs and reflector spots, you may need larger holes more widely spaced on the plywood panel.

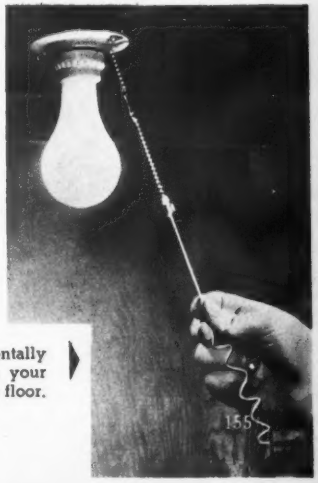


TO TRANSFER PERFUME without spilling it, immerse a soda straw in the liquid and close the upper end with your finger. This creates a vacuum making it possible to transfer the perfume with ease.



CUSHIONS FOR CABINET LIDS will save your nerves and protect the furniture. When the regular felt pads are worn out, replace them with cork disks cut from bottle caps.

EMERGENCY NIGHT LIGHT for sickroom or other use can be improvised by placing a flashlight on an inverted tumbler or tinted drinking glass. A sheet of white paper will increase the reflection if more light is desired.



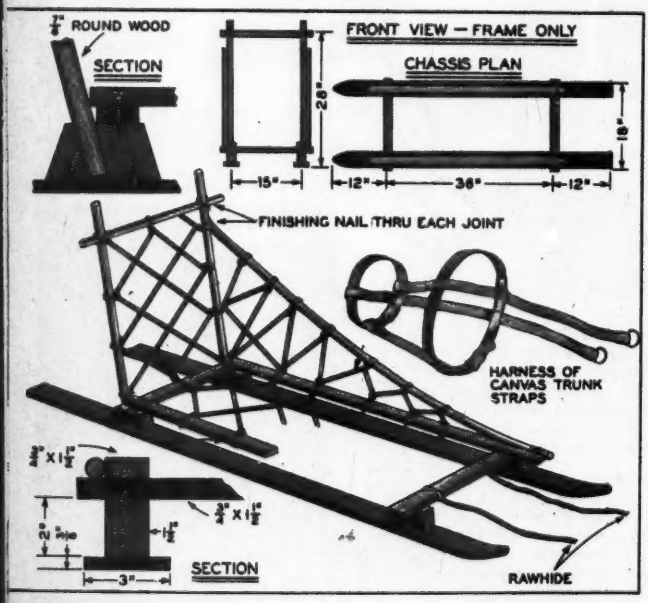
AVOID SHOCKS from basement pull chain sockets by using a length of cord as an insulator. This prevents accidentally grounding the socket through your body when standing on a damp floor.

Sled for Little Eskimos

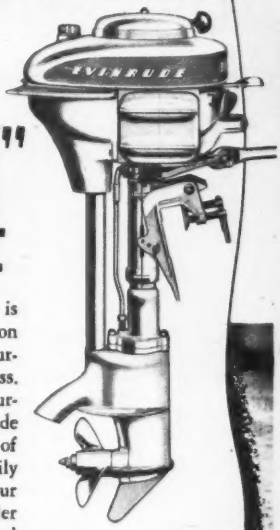
If you can get a pair of old skis then half of this project is done.

WITH a little help from the driver a fair-sized dog can draw this light sled with a small passenger at a brisk pace. Down grade the driver can get a ride by standing on the runners.

If you have a pair of discarded skis the job is half done, but lacking them, a satisfactory pair of runners can be made of ash or hickory by steaming or boiling the tips and bending them over a form. Blocks are screwed to these from the bottom with countersunk screws. The cross-members and side frames are then secured as shown. They are notched at 6 in. intervals to receive the rawhide lacing. The back frame consists of two round pieces set in the runner blocks and joined by a handle-bar of the same stock. Drive a finishing nail through all joints and bind with wet rawhide. Before lacing the bottom, nail temporary braces across the chassis to prevent twisting. Finish by applying a coat of spar varnish to all wood surfaces except the bottom of the runners which should be waxed and polished.



Boating's more fun with an Evinrude "4"



From shove-off to "home again", every mile is more fun when there's an Evinrude "Four" on the stern of your boat. *More fun* . . . with four-cylinder starting ease, flexibility, responsiveness. *More fun* . . . with the thrilling surge of four-cylinder power that flows with matchless smoothness. Back of Evinrude four-cylinder models are millions of miles of fine performance, years of engineering advancement. A favorite four for small runabouts, fast family and fishing boats is the Lightfour. Weighing only 66 pounds, Lightfour develops 9.7 O.B.C. brake H.P. at 4000 R.P.M. See your Evinrude dealer — look for his name in your classified phone directory under "Outboard Motors". Catalog of complete line of 7 Evinrude models FREE. Address EVINRUDE MOTORS, 5395 N. 27th Street, Milwaukee 9, Wisconsin.

In Canada:
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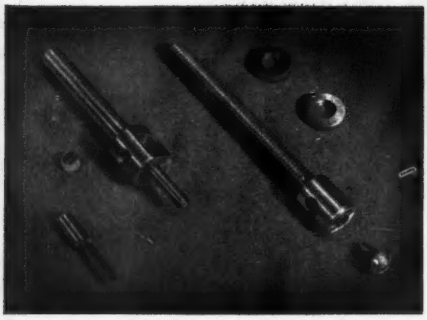
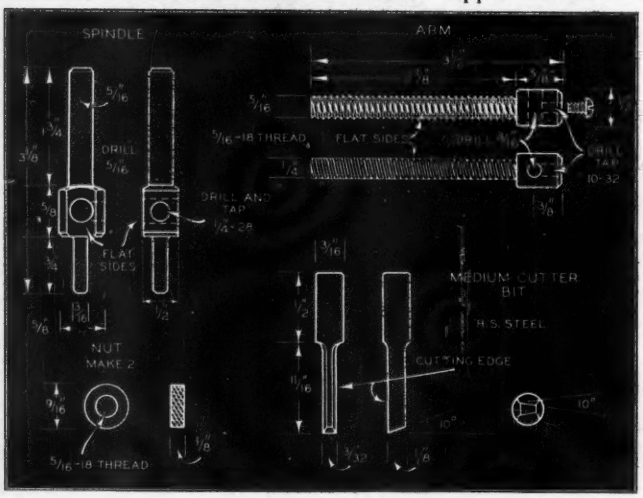
EVINRUDE

OUTBOARD MOTORS

Precision CIRCLE CUTTER



Above: Finished parts ready for assembly. Suitable setscrews may be found in shop stock or else cut. Additional cutter bits are ground as the need arises. Below: Set between centers, turn the spindle to size.



THIS unusual circle cutter is much safer and more accurate than most similar shop-made tools. The arm cannot work loose and fly out and the double nut adjustment permits setting the cutter bit very accurately. The pilot is part of the spindle, allowing the cutter head to operate close to the work and reducing the tendency of the cutter bit to chatter and work loose. The tool will cut circles from 1½ to 5½ in. diameter in wood, soft sheet metal, plastic, composition board, etc., up to ⅝ in. thick.

The spindle and arm are lathe-turned. Both are cut to length, the ends faced and the pieces finished. The spindle is then drilled and tapped as indicated in the drawing. The arm is next drilled, tapped and threaded and flat ground or filed on one side of the arm. A short setscrew in the spindle fits against the flat area so the arm slides through the spindle but does not rotate. The arm is locked in any desired position by two knurled nuts.

Cutter bits may be ground to any desired shape from broken taps, drills or other toolsteel scrap. The drawing indicates a general purpose bit.

—*Will Thomas*

Atlas-the compact, low-cost MILLER for tool rooms, production, commercial and home shops

Precision built . . . engineered for quick set-ups over a wide range . . . the rugged, versatile Atlas miller greatly increases the scope of your shop. It handles all operations from slabbing and facing cuts to end milling, keyways, finishing, and layout work. Table travels 10" horizontally, 3½" cross, 6" vertically, spindle speeds from 62 to 2870 RPM provide correct range for all types of work and cutters. Back geared power, complete V-belt drive, Timken bearings. Operates from ⅓ HP motor. Available now for fairly prompt delivery. See your Atlas distributor.

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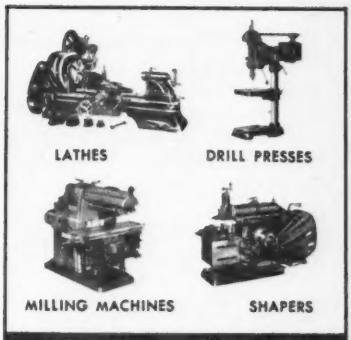
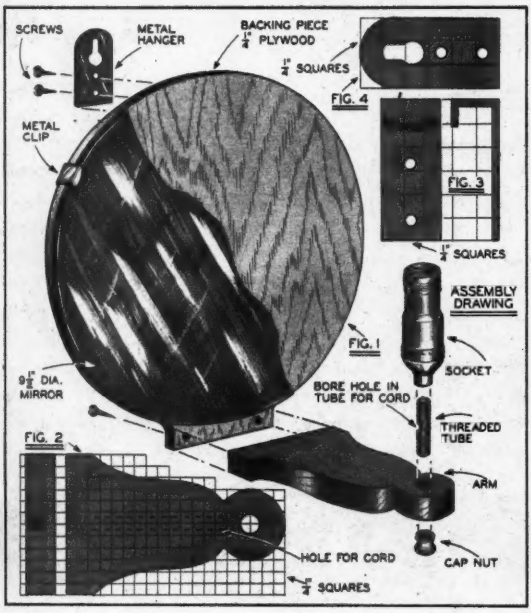


pin-up LAMP

A PIN-UP lamp means light exactly where you want it. They are such a convenience, the parts cost so little, and they are so easy to make that you will probably want to make several of them.

Basically a pin-up lamp is a bulb in a socket, enough cord to reach the nearest outlet, and some means for securing the socket in the desired location. But if, to these bare essentials, you add a clip-on shade and a mirror you can achieve a lighting fixture of genuine distinction.

Many of the parts came from the local five-and-dime. Mirrors of various shapes can be obtained from frame and picture stores.

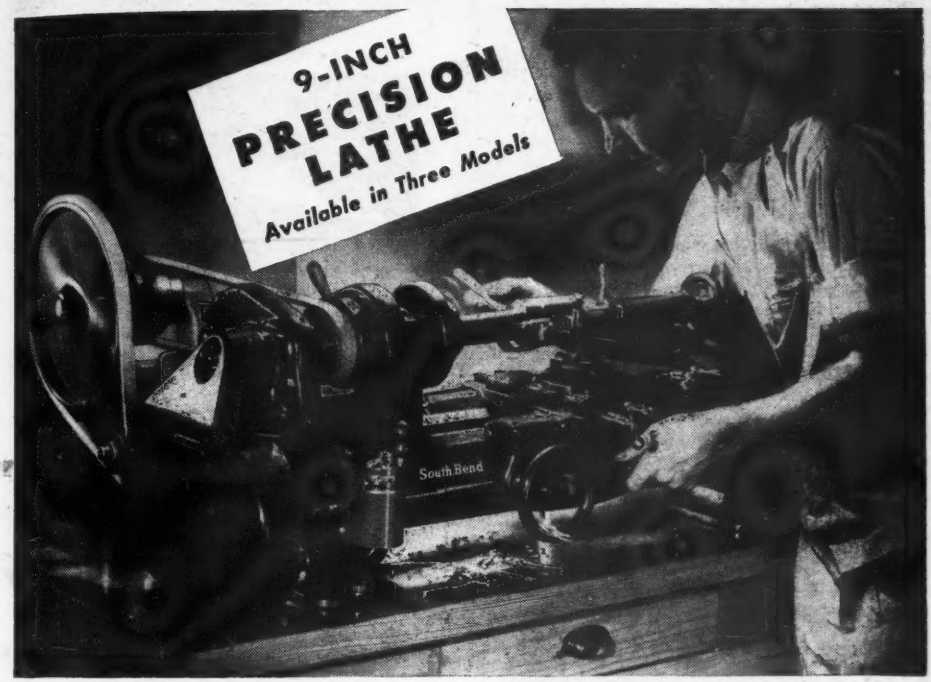


The mirror in the pin-up lamp illustrated is circular and has a diameter of 9½ in. Make a backing piece of ¼ in. plywood the same shape and size as your mirror plus a small extension to which is screwed the arm which supports the socket. The shape of the backing piece and of the arm are plainly shown in the drawing. The socket is held vertically by means of a piece of standard threaded tube about 1½ in. long which passes through the wooden arm. A cap nut secures it at the bottom. The unit is wired through a hole drilled through the arm and through the wall of the threaded tube.

The mirror is held against the backing piece by clips made of scrap metal bent as shown and screwed to the rear of the backing piece.

The lamp, when assembled, is suspended on the wall with a metal hanger as illustrated in the photo at top of the page.

SOUTH BEND



PLAN YOUR SHOP AROUND THIS LATHE

9-INCH LATHE FEATURES

Fine workmanship by highly experienced machine tool craftsmen

Superfinished spindle with large bearings

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Back-gear drive for power and low speeds

6, 8, 12 or 16 spindle speeds

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Precision lead screw for thread cutting

Worm drive and friction clutch for power longitudinal and cross feeds

Three hand-scraped V-ways and a flat way on bed insure perfect alignment of headstock, saddle and tailstock

The South Bend 9-Inch Lathe is basic equipment for all kinds of accurate machine work — precision manufacturing operations, auto, radio and appliance repair, tool and instrument work, model building, pattern making, and wood turning. A fine precision tool capable of machining work to exacting tolerances, it performs a wide variety of operations on metals of all kinds, wood, plastics, and similar materials. It is used for turning, boring, drilling, cutting screw threads, milling, grinding, polishing and many other machining jobs.

The 9-inch South Bend Lathe is practically a shop in itself as the addition of a few practical attachments will increase its versatility beyond the usual scope of lathe work. Write today for catalog giving complete information on this and other types and sizes of South Bend Lathes.

LATHE BUILDERS SINCE 1906

SOUTH BEND LATHE WORKS

453 EAST MADISON STREET, SOUTH BEND 22, INDIANA

Editor's Workbench Chips

[*Continued from page* 33]

some of the millions of dollars lost each year from late spring and early fall frosts.

The experimental burner developed can keep the temperature over one acre eight degrees warmer than surrounding temperatures at a cost of 75 cents per hour. This is expected to prove most useful protecting high-cost-per-acre. crops such as fruits, berries, truck gardens and flowers.

Infra-red heat warms the plants directly without warming the air—a large economy.

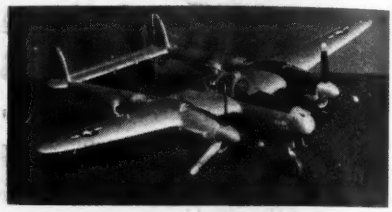
Outwitting the Germ

Fear that penicillin, streptomycin and other antibiotic remedies will sooner or later become useless is somewhat allayed by studies carried on in the laboratories of the Ohio State University.

As germs get used to penicillin through repeated contacts in the patient's body, they grow resistant to it; but—it now appears—doctors can switch from penicillin to other antibiotics, or the reverse, and cure the patient in spite of the germs' resistance.

In the research, resistant strains of two bacterial species, the boil-causing Staphylococcus aureus and the colon bacillus, Escherichia coli, were built up by exposing successive sub-cultures to increasing concentrations of each of the three drugs, penicillin, streptomycin and streptothricin. Then each kind was exposed to various concentrations of the two compounds not included in its "ancestral condition." With only a single exception, all of the resistant strains proved non-resistant to both of the other drugs to which they had never had a chance to become accustomed.

SCALE MODEL P-38



A $5.00 Workbench Award is winging its way to Franklin W. Miller of Miami, Fla., for his model of a P-38 Lightning. Built in six months of spare time it follows closely scale plans of the original. Sure looks like the McCoy.

Your Favorite Magazine Now 20c

With this issue the price of MECHANIX ILLUSTRATED goes to 20 cents. We've been fighting this for months, but rising paper and production costs have made it inevitable.

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Protect yourself and passengers with Pressure-Stat and prolong the life of your tires! The same automatic safety valve used by high speed, cross-country trucking fleets is now available for passenger cars. The new Pressure-Stat weighs only ⅕ ounce and will not disturb wheel balance at any speed.

Blowouts due to destructive pressure buildup cause thousands of accidents. Pressure-Stat eliminates this deadly over-inflation hazard. And Pressure-Stat makes any tire last longer under all driving conditions.

A Pressure-Stat is easily installed on each wheel without the use of special tools and left on for the life of the tube. Pressure-Stat not only prevents excessive pressure buildup but also eliminates the use of an air-gauge when inflating tires. Send in the coupon for your set today.

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☐ I'd like to know more about Pressure-Stat and am enclosing a 3c stamp. Please send me your illustrated descriptive folder.

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Street_____
City_____ Zone_____ State_____

MONEY BACK GUARANTEE

How Good Are Foreign Cars?

[*Continued from page* 68]

years ago on Roosevelt Raceway, Long Island, a track was built for an international road race, and what happened? Some of our best drivers who competed with American cars looked like kids from the soap box derby against the German and Italian drivers and cars. The course twisted and turned and did everything but loop the loop, and the foreign drivers made our boys look like the rank amateurs they were at the contest of shifting gears, fast acceleration, and fast braking called road racing. Several oceans of water have gone over the dam since any foreign entrant has won the famed Indianapolis classic, however— an almost top-speed race all the way. There were several foreign cars in the first ten this year, but only one foreign driver, and he finished seventh; so you see it's a case of making the car and driver fit the conditions.

If you still ask how we can compare our cars to such machines of super-performance, the answer is easy. The others are made, as pointed out, for sport driving—something we would almost call an obstacle race—but the biggest difference is seen in their normal life, so get a grip on your hats, foreign car fans, here it comes. The average sport car, regardless of how much it costs, is through, washed-up, worn out, useless, before it has gone 20,000 miles. I don't mean it needs an overhaul, I mean it is through! Compare this with many American cars that have gone several hundred thousand miles and are still going. Exceptions are found only among high-priced semi-sport cars that are never raced, but used like American family cars.

My objection to the semi-sport foreign car for American use centers around its cost of upkeep and temperamental nature. We in America expect to walk out to our garage on a cold winter morning, turn on the ignition and start. The semi-sport job may start right off, but then it may not. These cars are made like fine Swiss watches, compared to our dollar ones, and a little thing like a moist day or a drop of twenty degrees in temperature sometimes makes it almost impossible to get them running right. I used to own and operate a machine shop that specialized in servicing expensive foreign cars, and I can tell you, they are as temperamental as prima donnas. If you are an expert automobile man you might get a lot of fun out of catering to their whims, but if you are not, they can cost you a mint of money. In fact, they are just too fine a piece of machinery to be hacked around on trips to market or station or to the movies after dinner. To give an idea, I drove a Mercedes Benz to the West Coast one time, and on cold days at high altitudes I often had to change the spark plugs to a hotter type, to say nothing of making complete carburetor adjustments for every change of altitude and weather. It was fun being able to cruise at 100 in open country and it was fun to hear the roar of the

[*Continued on page* 164]

Smooth, steady power at your fingertips! Perform precision operations not possible with any other portable tool! With a Handee you can turn out professional-looking projects for pleasure or profit—ship, plane and train models, costume jewelry, wood carvings, puppets, initialed tumblers, etc. AC or DC. 25,000 r.p.m. Wt, 12 oz.

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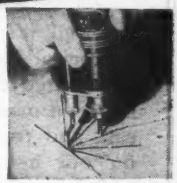

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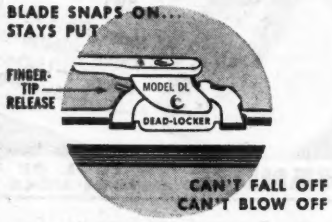

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DON'T SHOOT YOUR GAS-PUMP MAN!

He's doing the best he can. Sure, he knows how dangerous it is for you to drive your car . . . in stormy weather . . . with your dull old windshield wipers that smear and smear. He'd gladly put on for you quickly a pair of keen new ANCO RAIN-MASTER Wiper Blades and Arms. He has them—Newest Models! But he forgets to remind you? Too busy? You can't shoot him for that!

After all, it's *your* car to protect. So *you* remind *him*. Get RAIN-MASTERS . . . patented features . . . original equipment on many makes of high grade cars and trucks . . . used in war—on our fighting tanks and trucks and ships and bombers too...because ANCO RAIN-MASTERS clean quicker, clean cleaner . . . last longer. May save you a costly smashup.

Ask for RAIN-MASTER Windshield Wiper Arms and Blades next time you buy gas.

THE ANDERSON COMPANY
Established 1918
GARY, INDIANA

How Good Are Foreign Cars?

[*Continued from page* 163]

engine that always announced my arrival to some prairie town five miles before I got there, but such fun has to be paid for, either in money or in hours under the hood.

No one ever loved sporty cars more than the late composer, Vincent Youmans, and few men have known how to drive them better. Vince, when he died last spring, owned a Lincoln Continental, a Rolls Royce and a Mercedes Benz, the last, one of the fastest cars ever built. Twice a year, usually, he would drive from New York to Los Angeles in four and a half days; it was a game with him to try and beat the train's time. He would drive at night, from six P.M. until seven or eight the next morning; then he would sleep all day until it was time to go again. Which car do you think he used? That's right, the American Lincoln Continental, in spite of the fact that his own Mercedes won one of the last great road races held in Germany before the war. He knew the Lincoln Continental would keep going, hour after hour, without any fits of temperament. Even though he couldn't cross the prairies at a cruising speed of 100 or better with it, he could hold a steady 75 to 80 most of the night, and brother, that gets you places.

I'd like the chance to bet on our three most popular low-priced family cars, in a race from coast to coast against three of the best foreign sport cars. They'd streak far ahead when it came to high-speed cruising; but the steep climbs to high, cold altitudes, the sudden descents, the western mountains, the searing deserts which go on for hundreds of miles—these would produce just about every known driving condition. I'd back our cars every time. Because—they're the cars that take old Doc Jones to meet the stork at three on a Vermont winter morning; they're the cars that deliver the mail along the Rio when the temperature is well over 100; and they're the cars that take thousands of Americans to work and back five days a week the year round. They are American cars, rough, tough and full of fight, not so fast and maybe not so pretty, but they keep going somehow even after the last fender has fallen off.

This is America and our cars are right for Americans.

The female chimpanzee usually bears a single baby, which reaches maturity in about nine years if a female, and 12 if a male.

The cleansing power of soap is supposed to depend upon its emulsifying action, or its ability to break up foreign material into fine particles and hold them in suspension.

How long the giant Galapagos tortoise lives is uncertain but scientists estimate from "growth rings" around the plates on their backs that some are over 150 years of age.

PTM Wonder Wave of Radio

[*Continued from page* 82]

the broadcasting station, or, if there is an intervening building, it is aimed at the best echo.

A fine thing about PTM is that it will be free from noise and static, to the same degree as frequency modulation. Like FM, this system is independent of amplitude modulation, thus permitting the use of limiters and gates in the receiver. PTM broadcasts will not be affected by sunspots since the ultra-short waves do not travel to the ionosphere and bounce back, as those of medium length do.

All types of radio broadcasts, including FM, can be picked up and sent out over the PTM system. An FM broadcast would be received on an FM receiver, and the signal would then be converted and sent through the PTM transmitter.

When are we to have pulse time modulation in practical operation for our own use? I T & T has made no announcement as to this. It has no commercial license as yet. The experimental broadcasts are transmitted at 930 megacycles under an experimental license.

It should not take so long for PTM to come into practical use as it has taken frequency modulation, because the change-over process is less complicated. People have hesitated to buy FM sets, even when they were obtainable, because there were so few programs they could pick up. Since eight or more programs can be sent out over a single transmitter, using the PTM devices, this problem should be more easily solved. As soon as one broadcaster gets a PTM license and sets up a transmitter, he could offer a choice selection of entertainment at once.

Then comes the business of manfacturing and selling the special receivers. The sets should cost about the same as equivalent receivers of present types when production reaches a high level, according to engineers of the company.

Maori natives of New Zealand were the best wood-workers in the Pacific; they lavished their construction and wood-carving art particularly on their council houses.

Seasoned oak, beech, hard birch, hickory, rock maple and black locust have high heating efficiency; a cord of any of these has about the same heating value as a ton of hard coal.

Descendants of Filipinos, who settled in Louisiana about 1710, can be found in Manila village near New Orleans.

A single pocket gopher has been known to dig an underground tunnel over 600 feet long in 48 hours.

The breastbone of the bat has a keel for the attachment of the strong muscles used in flying.

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***use* PLASTIC WOOD**

***in your* HOME WORKSHOP!**

If you'd like a satiny smooth, professional finish on your next cabinet job—use Plastic Wood! It's an ideal filler for cracks or rough grains, dries tight and hard, sands to a swell finish and takes paint, lacquer or varnish perfectly. Here's an extra hint—knot holes or gouges just disappear when this handiest filler is used! *Handles like putty—hardens into wood!*

. . . dozens of other uses

FOR FILLING . . .
- Countersunk screws
- Chipped furniture
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FOR REPAIRING . . .
- Loose casters
- Broken balusters
- Broken furniture

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4 assorted regular X-acto blades.
2 3-inch blades.
1 specially designed X-acto handle.

Gouge and chisel blades are designed with architectural rib, for rigidity and control in cutting. Complete, $3. At hobby, gift and hardware shops.

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Send Free Plan on Saw Filing business, no obligation

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Ace In The Sky

[*Continued from page* 75]

wing design carries four persons in an unusually roomy cabin of high visibility all around the compass. On the ground this visibility is retained, thanks to a fixed "trigear" with a steerable nose wheel. The two front seats are of the individual "bucket" type while the rear seat is a full width "hammock." The all around windows, unusually ample head room, plus doors on both sides will step up the popularity of this British design

The ship as now built is of mixed construction, with a wood wing and a fuselage of welded steel tubing covered with fabric. Later, the production models will have metal wings and tail units.

The engine in this model is a "flat four," as they say, Lycoming of 100-hp giving the Ace the following performance: Maximum speed of over 120 mph, a cruising speed of 110-120 mph and a range in still air of just under 400 miles. The "all-up" weight is 1,650 pounds.

The engine of the new ship is unusually easy to service for it is less than shoulder high from the ground and the cowling is designed to open entirely via a full-length hinge on the right side. The lower half of the cowling may be quickly removed, complete in one piece, for servicing of the lower half of the power plant.

All in all it's a mighty interesting ship from any angle, and if I have to learn all over again, okay, okay. For I, for one, would like to fly it!

Barbed Wire Fence Gate

Probably the simplest gate ever devised for a barbed wire fence is two lengths of garden hose slipped over adjoining strands. It is a particularly handy device if you have to pass through the fence more or less infrequently and do not want to go to the bother of erecting a regular gate.

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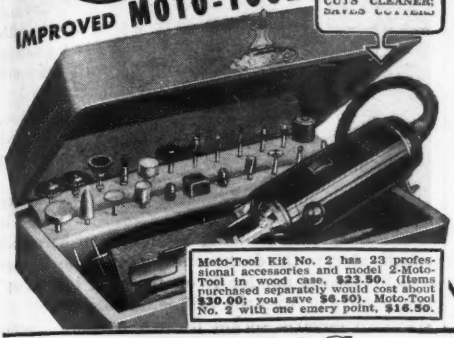
OWN A "POCKET SIZE" MACHINE SHOP

IMPROVED MOTO-TOOL

APPROXIMATELY 27,000 R.P.M. CUTS CLEANER; SAVES TIME



Moto-Tool Kit No. 2 has 23 professional accessories and model 2-Moto-Tool in wood case, $23.50. (Items purchased separately would cost about $30.00; you save $6.50). Moto-Tool No. 2 with one emery point, $16.50.

HERE'S A CRAFTSMAN'S GIFT THAT PACKS YEARS OF PLEASURE

Here's a gift to please a man's heart. A gleaming "powerhouse" that holds promise of endless creative hours. This "pocket-size machine shop" is a war veteran . . . used by all branches of the armed forces in far flung repair bases . . . and it helped set production records at General Electric, Westinghouse, Remington Arms, Ford and other plants. Hobby enthusiast or expert craftsman . . . first choice is Model 2 Moto-Tool kit, with its handsome, felt-lined, highly finished wood case . . . with rows of tools begging to be put to work. The usefulness of Moto-Tool for precision work is increased by two versatile attachments now available at slight additional cost (see below).

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Moto-Tool Stand (left) made of heavy cast iron, holds Moto-Tool at any position or angle -----$4.50

Moto-Tool Shaping Table $2.50 (Shown with stand, right). Aids accuracy in routing and grinding.

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- ☐ Burring
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- ☐ Routing
- ☐ Sanding
- ☐ Drilling
- ☐ Inlaying
- ☐ Sawing
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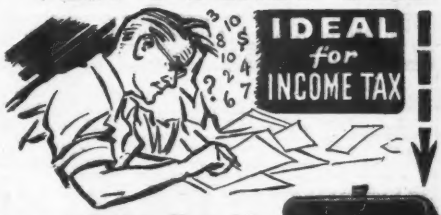

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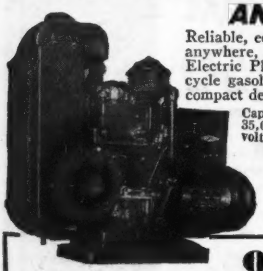

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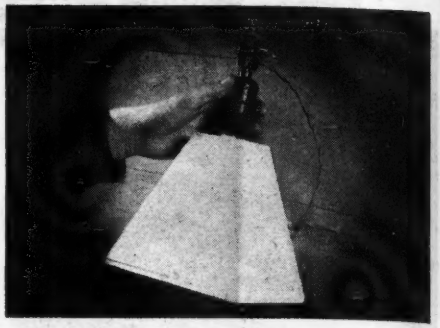
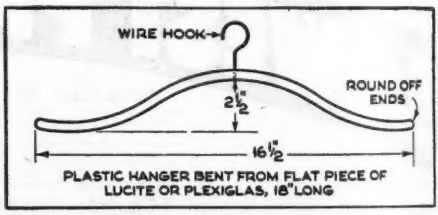
A Safe Safelight



The darkroom hanging safelight can be made much safer, to the darkroom worker, by assigning a definite position for it on the wall instead of suspending it from the ceiling. A combination of standard electric socket fittings, as shown, permits the light to be swung or twisted.

A small flange is screwed to the wall. To this is fitted a length of 1/8 in. pipe long enough to extend the safelight over the trays or tanks. The socket of the safelight is fastened to the outer end of the pipe by means of a hinged coupling. This arrangement saves the photographer from banging his head into the safelight, and also keeps the latter from falling accidentally.

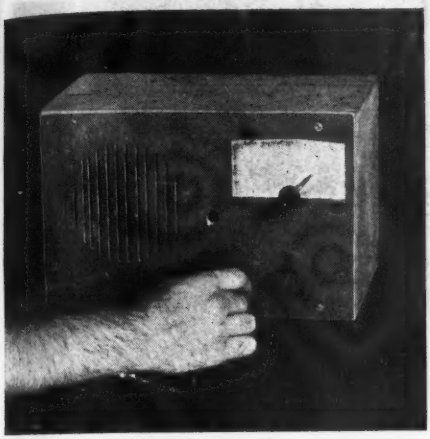
Plastic Hanger



Those fancy plastic hangers that sell for a couple of dollars in the stores can be made in your own oven for a few cents apiece, believe it or not! Obtain a piece of Lucite and Plexiglas 18x3/8 in. thick in any random width. Cut it into 1 in. strips on the circular saw, or by hand. It cuts just like putty. Place several strips in the oven with the gauge set at 350 degrees. After three or four minutes remove a strip (wear gloves) and bend to hanger shape, as sketched. Hold it until it is cool enough to retain its shape, about two minutes. Repeat with the remaining strips.

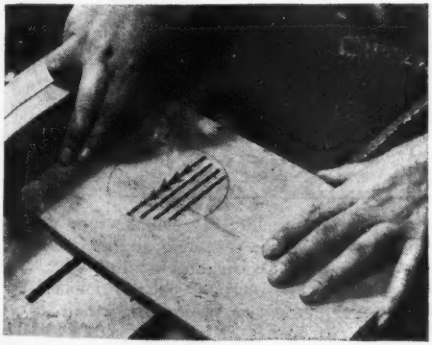
The hook can be a standard hook from an old wooden hanger or may be bent from stiff wire. Drill a hole in each plastic hanger exactly at the center of the highest point in the curve. The hole should be slightly smaller than the thickness of the hook. Drive the latter in and the hanger is complete.

Radio Loudspeaker Grille



For the radio fan who builds his own sets, one of the most time-consuming jobs is cutting out the speaker grille in the cabinet and covering it with cloth. Usually some design has to be worked out and cut in the front panel to avoid having a large hole covered with an expanse of cloth.

This chore can be eliminated by using your circular saw to make the attractive grille shown above. This is complete in itself and doesn't require any finishing with cloth. The first step in making the grille, is to locate the center and draw a circle of the desired diameter. This outline serves as a guide for the finished opening. Next, set the circular saw blade slightly higher than the panel thickness and arrange the fence so you can make parallel cuts. With the saw turned on, carefully place the circle on the panel over the blade and move it back and forth within the limits of the line as shown below. After each cut, move the fence ⅜ of an inch until the outline is completely filled with parallel cuts. Finish the cuts by using a ⅛ inch file, working up to the circle line. Following this, the holes can be drilled for the controls and the dial mounted in place.



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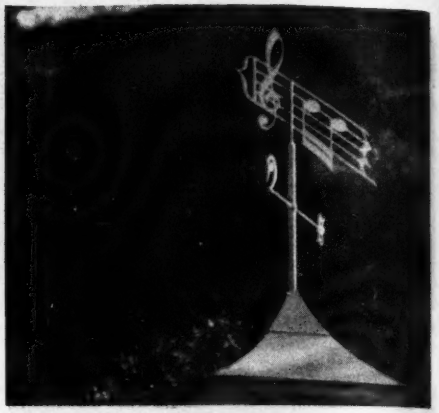
Styles in Weather Vanes

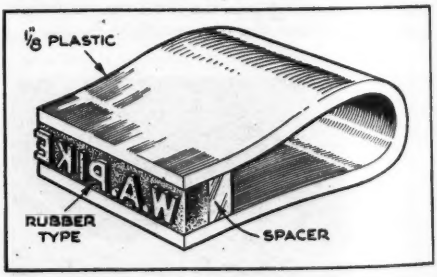


If you are a concert addict how about making a suitable weather vane for your house. It will not only tell you which way the wind is blowing but add a lot of personality to your home. Such a weather vane can usually be made from scrap metal.

But, if you're not musically inclined and your name can be represented by a tangible thing such as a bird, or a bell, why not mount one of these? You'll have everyone in town praising your originality and perhaps copying your idea. And that's always a compliment!

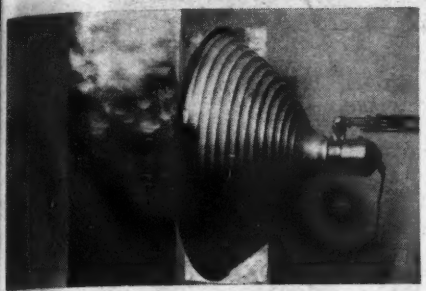
If you're a doctor, you can hoist a pill-box over your chimney, possibly in conjunction with a horse-and-buggy. A racquet vane for the tennis fan, a rifle vane for the skeet-shooter, a sombrero for a Westerner, or name your own motif. There's no end to the styles of weather vanes you can dream up that will tie in with family interests or hobbies. They're an interesting addition to the top of the house.

Plastic Rubber Type Holder

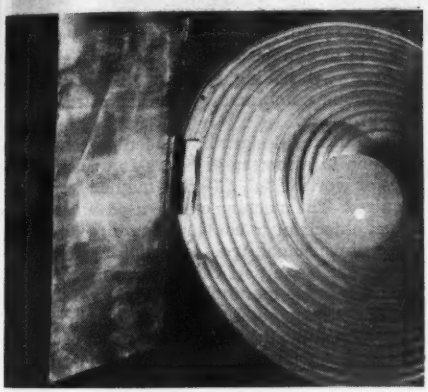


An excellent holder for rubber type can be made out of a piece of Lucite or Plexiglas. Heat the plastic until it is soft and bend it with gloved hands. Cement a piece of plastic to match the height of the type, as a spacer. The handle should be about two inches high and of suitable width.

Floodlight Deflectors

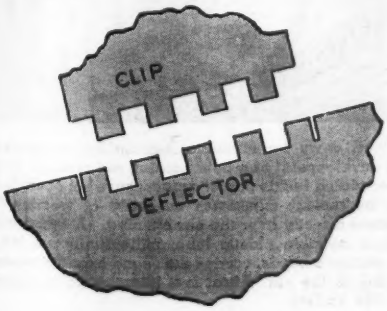


Hinged side deflectors attached to a regular photoflood reflector permit interesting lighting effects.



The photos show how a couple of deflectors, called "barn doors," can be clipped to standard photoflood reflectors to achieve unusual edge-lighting effects.

The deflectors are made out of two 28 oz. tomato cans. The hinged part of the clip is made by cutting ¼ in. tabs, as shown below, which are rolled over a piece of wire which serves as the hinge pin. Leave enough metal on the hinge so that it can be folded back to form an S-shaped clip. The hinge should fit tightly so that the doors will always stay put.



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Drills to center of circle	5⅝"
Spindle Travel	2⅛"
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Size of base	3½" x 3½"
Overall height	23"
Overall width	3½"
Overall depth	10"

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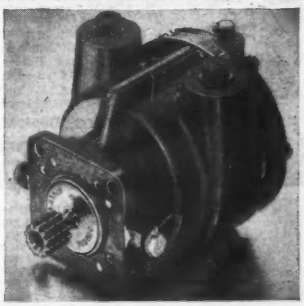

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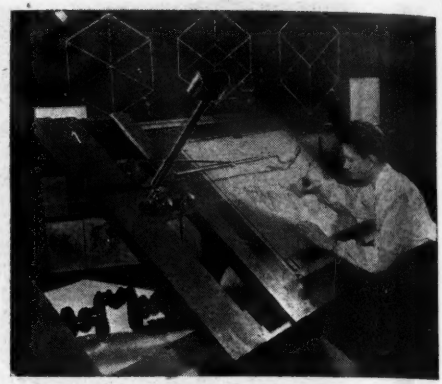
"Robot Rembrandt"



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Women's Hearing Aid

Good news for feminine hearing loss sufferers is this development of a new hearing aid receiver which is concealed inside one of an attractive set of earrings. The instrument eliminates necessity of wearing the receiver directly over the ear opening. A transparent, almost invisible plastic tube, individually molded to the wearer's needs, carries the sound from the receiver earring to the ear. Attractive, interchangable designs provide variety.

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Can you drive a nail into cold, hard steel? It can be done, as shown above. That's the way the metal tag at right was fastened to the base of the ingot. Impact does the trick—just as in the phenomenon of the straw blown through the limb of a tree by a strong wind.

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AZ50	5.00	4.75	1/2, 5/8, 3/4, 1	.87
AZ60	6.00	5.75	1/2, 5/8, 3/4, 1	1.13
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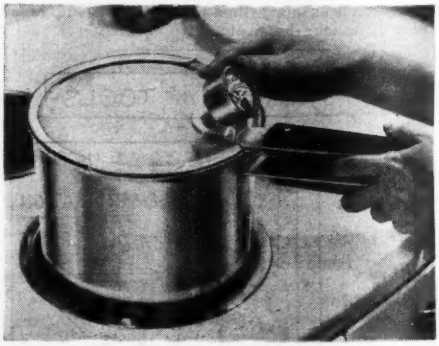
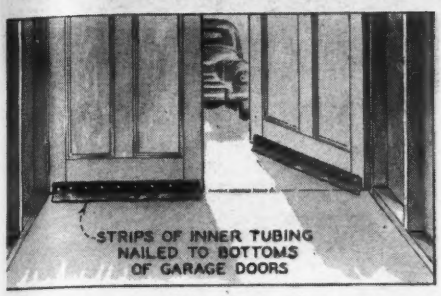
NEW PRODUCTS

A vacuum cleaner for automobile interiors that operates off the engine manifold is being made by Craft Industries of Buffalo, N. Y. Molded of Tenite plastic, the flashlight-size cleaner is sturdy but light in weight. In operation, the engine is run at idling speed and the cleaner connected to the windshield wiper by means of a 12-foot non-kinking hose, running through the wall of the glove compartment in the car.

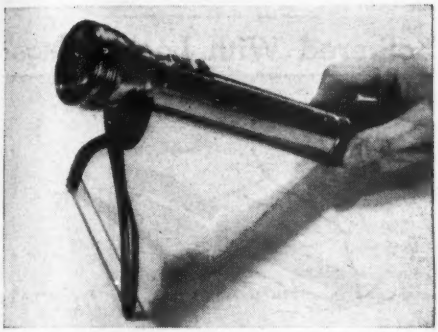


The distaff side of the family will appreciate this new stainless steel, copper-clad pressure cooker. It features a gadgetless cover and a combination gauge and safety valve that automatically lifts off at 15 lbs. pressure. Retailing at $15.95, the 4-quart cooker is made by Revere Copper and Brass Incorporated of Rome, N. Y.

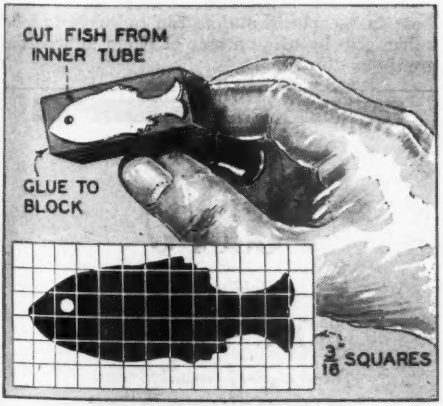
Household Hints



If leaves or other litter blow under your garage doors, you can keep them out, along with stray cats, by nailing inner tube strips in place as shown. This will also keep the garage warmer.



A pair of pliers and a rubber band make a handy pair of "legs" for the flashlight when you're doing some job that requires the use of both hands. To adjust the light, simply shift the pliers.



Rubber stamps of fish and animals can easily be made by cutting the figures from inner tube scraps and gluing them to discarded stamp blocks. They'll keep children amused for hours on rainy days without the mess that goes with paints.

In a nation-wide survey among carpenters, 92 out of every 100 reporting said they owned Disston saws. The reasons these experts give for such outstanding preference are that Disston saws are faster cutting, do finer work, require less frequent sharpening and last longer.

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Fits in bench vise. Quickly, easily forms all kinds of angles in sheet metal, strap iron and aluminum, wire and plastic. Use it to make useful articles, experimental research work, patent models, etc. Simple gages made for quantity duplicating. Now available. Send for details, or order direct. C.O.D. $2.00 deposit. Wt. 10 lbs.

SAMPLES OF WORK

We also make a Vise Shear, cuts sheet metal any length by successive cuts. 4-inch, adjustable blades. Also cuts small bar iron. Adjustable guide for duplicate shearing. Same price as Vice Brake. Both guaranteed.

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WATER SOFTENER

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with a cutting range of 3/8" to 2 1/2"

Two Bruno Adjustable Hole Cutters in one convenient kit for home users, mechanics, farmers, technicians! High speed steel blade cuts clean, fast holes in metal, wood, plastics. Quickly adjustable and easily sharpened. For drill press, portable drill or hand brace. **Money back guarantee!**

Only $7.85 Complete

POWER CUTTER KIT CONTAINS

MODEL	SHANK SIZE	EXPANSION	PRICE
100	1/4" st. shank	5/8"—1 1/2"	$3.00
101	3/8" st. shank	1"—2 1/2"	$5.00
790 KIT		5/8"—2 1/2"	$9.00*

*Fair Trade Minimum $7.85

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STEELS and ALUMINUMS with a motorboat tone

SINGLES, Chev, V-8, Plymouth, Steels $5.50, Aluminum $6.50. Chry., Olds., Buicks, etc., Steels $7.50, Aluminum $8.50. V-8 and MERCURY DUALS, Steel $17.50, Aluminum $20.00. Aluminums are guaranteed for life of your car.

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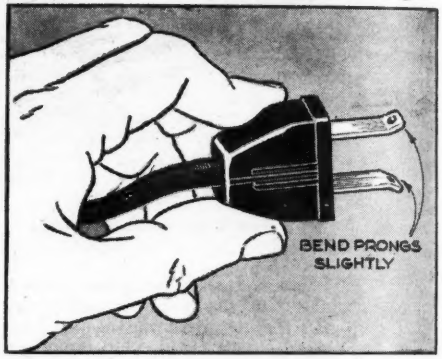
Water Color Containers

The cup-shaped separators used in egg crates make ideal containers while working with water colors. Give the cardboard a couple of coats of melted paraffin to prevent the paints from soaking through.

Bothered With Loose Plugs?



Electric appliance and lamp plugs that are loose in receptacle outlets can be made to take a firm grip by using a pair of pliers to bend the prongs as illustrated.

Give

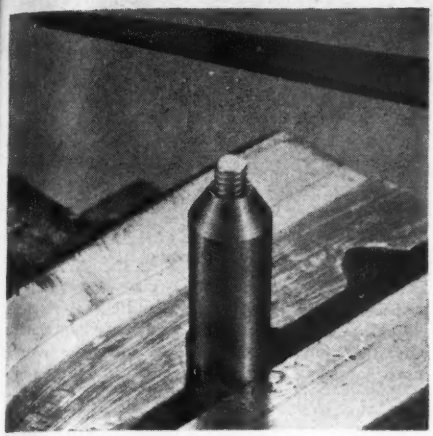
Help us build

Hope Institute

First model hospital for care of advanced cancer patients

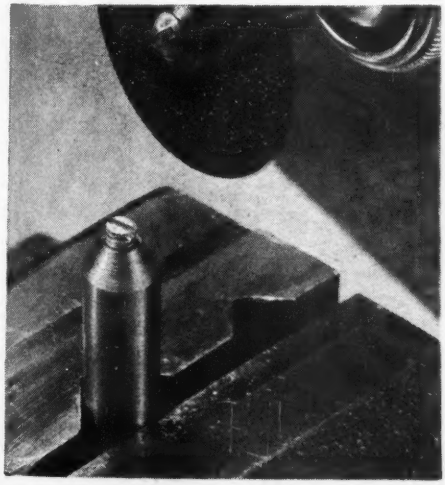
THE NATIONAL CANCER FOUNDATION
85 FRANKLIN STREET • NEW YORK 13, N. Y.

Midget Setscrews



If you're tired of haunting local hardware stores for those elusive miniature headless machine screws, why not make them yourself in your own shop? With a small supply on hand, you'll find many uses for them on models, small tools and other workshop projects. All the equipment you'll need to make the screws is a holder similar to that shown in the photos. This is made by drilling and tapping a short length of ¼ in. rod for the size screw desired.

After the screw has been tightened in the holder, cut it off slightly longer than required to permit filing the surface smooth and flat. The slot can be cut with either a fine jeweler's blade or a thin cut-off grinding wheel mounted in a hand grinder. After it is finished, the setscrew can be backed out of the holder with a small screw driver.—*Frank McCarthy*



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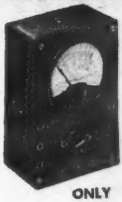

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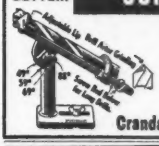

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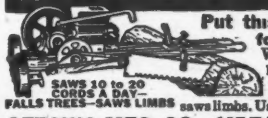

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of MECHANIX ILLUSTRATED published monthly at Greenwich, Conn., for October 1, 1946.

State of Connecticut } ss.
County of Fairfield }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Gordon Fawcett, who, having been duly sworn according to law, deposes and says that he is the Business Manager of MECHANIX ILLUSTRATED and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Fawcett Publications, Inc., Greenwich, Conn.; Editor, Robert Hertzberg, Jackson Heights, L. I.; Managing Editor, Ralph Daigh, Pelham Manor, N. Y.; Business Manager, Gordon Fawcett, Greenwich, Conn.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Fawcett Publications, Inc., Greenwich, Conn.; W. H. Fawcett, Jr., Norwalk, Conn.; Marion Bagg, Tulsa, Okla.; Roger Fawcett, Greenwich, Conn.; V. D. Fawcett, Greenwich, Conn.; M. B. Fawcett, Norwalk, Conn.; H. A. Fawcett, Greenwich, Conn.; Roscoe Kent Fawcett, Greenwich, Conn.; M. F. Fawcett, Greenwich, Conn.; W. H. Fawcett Trust, Greenwich, Conn.; M. B. King, Oxnard, Cal.; Gloria Fawcett, Oxnard, Cal.; V. L. Buckley, Santa Barbara, Cal.; Mrs. Eva Roberts, Seattle, Wash.; Fawcett Publications, Inc., Greenwich, Conn.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is ————. (This information is required from daily publications only.)

GORDON FAWCETT,
Business Manager.

Sworn to and subscribed before me this 12th day of September, 1946.
[Seal.] LILLIAN N. BUSHLEY,
Notary Public.
(My commission expires February 1, 1948.)

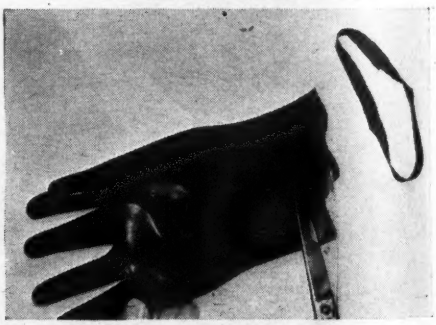
Using Smaller Sized Film

If you want to use a smaller size film in your camera (plate or cut-film style) here is an inexpensive way of doing it. The illustration shows an oblong of cardboard cut to fit your plateholder. On this is pasted four ordinary mounting corners used to fasten photographs in albums. The film is inserted into these corners.

Safety Glass

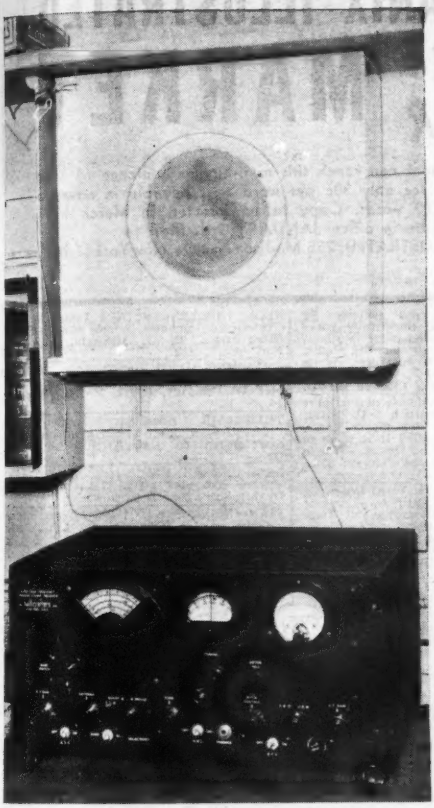
It is easier to handle glass sheets, used in the darkroom for holding down enlarging paper and for printing purposes if the raw edges are bound with half-inch scotch tape. The tape provides a smooth polished edge that will not cut the hands.

Rubber Band Source



Large rubber bands may be obtained by cutting worn or punctured household gloves as illustrated. If a paper cutter is available a neater job may be done than with a pair of scissors.

Space Saving Speaker



Most short-wave receivers use separate rather than built-in loud speakers. Instead of putting them on top of the set, mount them on brackets on the wall. This leaves the top of the set available for inspection, cleaning, tube checking, or other accessories. The photo shows an 8-inch speaker mounted in a box baffle about 20 inches square, directly above an S-36A ultra-high-frequency receiver. This arrangement is very satisfactory.

FIX IT YOURSELF!

You don't even have to be handy with tools . . . just get an O'MALLEY FAUCET REPAIR SET . . . read the simple directions . . . and in a few minutes you can cure your faucet of its messy, water-wasting, nerve-devastating Drip-Drip-Drip. Costs less than a dollar, depending on the size you require, wherever hardware is sold.

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Describes all manner of Production and Shop Work on KRW Hydraulic and Bench Type Arbor Presses. 32 pages illustrating the new KRW Hand-operated, Electric-operated and Air-operated Hydraulic Presses.

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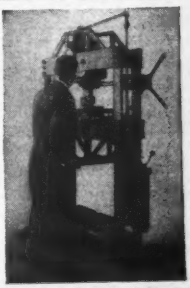

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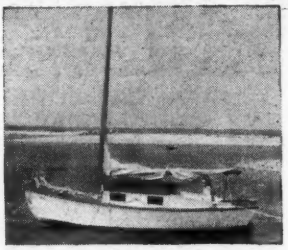

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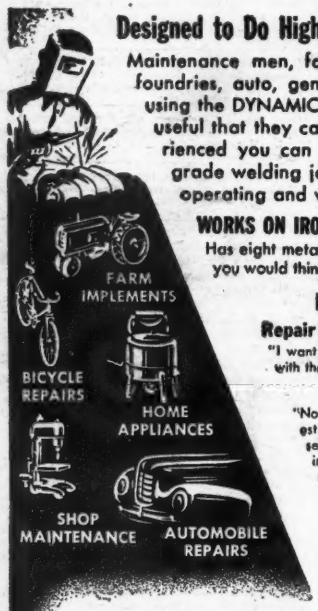

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